THE ENGINEERING AND MINING JOURNAL

Equipment for Oil Fuel.

BY GEORGE W. MELVILLE.†

Strainers.—The majority of the crude oils having been obtained from wells driven into the earth, of necessity carry in the body of the oil, more or less intimately mixed, certain small proportions of water, as well as more or less sand or grit. The heavier and more viscous the oil, the greater the tendency there is to hold in suspension these deleterious substances.

In general, it can be assumed that no crude oil is perfectly clean. Therefore, in the installation of any oil-burning plant, special provision should be made for straining out all sand and foreign matter. Arrangements should always be provided for catching the water as it slowly settles to the bottom of the tanks or bunkers.

The effect of sand in oil increases the wear on the small annular nozzles of the oil burner, or, when using burners provided with specially small orifices, these openings may become altogether clogged.

The gauge used for oil strainers should not be too open, and should be formed of brass wires, or probably a width of meshwork equal to about half the width of oil orifice in the burner.

In the placing of these strainers, it is not unusual to find a strainer placed on the oil pipe on each side of the pump, thus insuring that no grit gets into the pump, and that any particles of old packing or other material from the pump cannot go to the burner through the last filter. A still more desirable plan is to have two strainers between the pump and the burners, so that when one filter is being opened the current of oil can be transferred by means of a by-pass valve through the other filter.

Separation of Water.—There is no practicable device that will directly separate the water from the oil. This separation can only be satisfactorily effected by allowing the water to settle to the bottom of the tanks by gravity. It therefore follows that if the suction to the oil pumps is placed in the bottom of the tanks, water will be often drawn when only oil is desired. A thread of water blown into the oil burner effectually extinguishes the flame in the furnace, and if the oil does not soon follow the water, there may be difficulty in relighting without introducing an outside flame. In order to insure a supply of oil from the tank without an admixture of water, devices have been adopted whereby the oil-suction pipe is caused to swing up or down in the oil bunker to a level at which it is known that pure oil can always be obtained.

In a construction used in English tank strainers, the movable oil-suction pipe is carried by a float. The suction tip is thus always maintained at a point within a few inches of the top of the oil. The tip is also surrounded by a steam-heating coil, the object of which is to slightly heat the oil in proximity to the inlet, thus increasing the fluidity of the oil, so that even in cold weather the oil may be readily pumped.

At the bottom of each bunker there should always be provided a water cock or blow-off for the purpose of blowing off any water which may be found to have settled in the tank or compartment.

Certain crude oils at the ordinary temperature of the atmosphere are of great viscosity, which viscosity increases as the temperature gets lower. At 30° to 40° F., which is not an unusual outdoor temperature, the fluidity of the oil is so light that it is almost impossible to pump the oil or to force it to the burner. It is therefore necessary, where fuel oil is to be used in regions which are subjected to severe winter temperatures, that there should be means for heating the oil so that it may more readily flow to the pumps. The usual manner of accomplishing this is not to attempt to heat the whole tank or bunker of oil, but simply to heat the oil immediately surrounding the suction pipe to the pumps. This can be easily accomplished by placing a coil of a few turns of steam pipe about the suction pipe.

In all pipes intended for the transmission of crude oil, it is desirable that connections should be made to them, so that steam can be turned into the pipes after shutting off the oil. These pipes can be thus cleaned by the heat and the force of the blowing steam, and any deposited asphalts, paraffins or condensed hydrocarbons can be cleared out before the pipes become choked so as to impair their efficiency.

The heating of the oil should be always recommended as an aid to secure better operation of pumps and burners; but this heating should never be carried to such a degree of temperature as will cause decomposition of the hydrocarbons of the oil. The degree of temperature at which such decomposition is likely to occur has been ascertained for the oils of each region.

Oil Pressure Regulators.—With most burners it is desirable that a uniform pressure should be maintained on the oil circuit to the burner. If it were possible to keep the pumps automatically and perfectly regulated, a uniform pressure could be secured.

A reliable plan is to provide the oil chamber of the pump with what would correspond to an air chamber on the water pump, or to provide a separate tank or chamber in which a constant air pressure is maintained on top of the oil by additional means.

In all oil installations, it is very important that the control of the oil pump and of the steam to the burner or of the compressed air, where air is used, should be so arranged that in case the delivery of any one of the fluids is reduced or interrupted, a corresponding reduction or shutting off should be effected in the supply of the other elements.

It is especially important that oil should in no case continue to be forced or pumped to the burners when the steam or air required for spraying is shut off, as in such an event the unsprayed oil is liable to flood in upon the hot brickwork and a furnace explosion is sooner or later likely to occur. The underwriters' regulations in many cases specifically require that in the event of the stoppage of the oil flow to the burner, all the other functions shall be caused automatically to cease.

*Excerpt from a paper presented to the Tenth Navigation Congress at Milan, 1905.

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Treatment of Zinc-Gold Slime.

In a paper by Thomas and Williams, on the employment of sodium bisulphate in lieu of commercial sulphuric acid in the zinc plant clean-up (*Journal* of the Chemical Metallurgical and Mining Society of South Africa), it is stated that during the solution of the zinc in the bisulphate of sodium liquor, a most noticeable feature was the entire absence of the extremely unpleasant odor, generally associated with the zinc plant, and consequently no tendency toward gassing the men looking after the dissolving vats. The poisonous effect of the gases usually evolved from the acid vats is largely, if not wholly, due to the presence of arsine (AsH_3). Commercial sulphuric acid, as commonly prepared from the burning of pyrite, always contains more or less arsenic in solution; and this, in the presence of nascent hydrogen, is converted into arsine and given off with the hydrogen gas. The acid employed in the preparation of the sodium bisulphate is manufactured from pure Sicilian sulphur, and is consequently free from arsenic. This is no doubt a matter of considerable importance, in view of the very dangerous effects of arsine poisoning, for it is a well-known fact that a man once "gassed," or overcome with these noxious fumes, is always very liable to subsequent attacks, often with serious results. The experiments showed other points in favor of the substitution of sodium bisulphate for crude acid as a solvent for the zinc.

The rapid growth of reclaiming rubber from old articles of that material is shown not only in the number of patents that are issued covering new methods, but is also reflected in the new companies formed and in the additional plants erected. This is due to the high price of crude rubber. Around the mines old rubber packing and valve seats should be saved as carefully as is scrap iron. There is great demand for this old material.

The British Iron Industry in 1904.

The British Iron Trade Association, like the American Iron and Steel Association, publishes an annual report with statistics, which contains the more important, and, at the same time, the most reliable data obtainable on the British industry of iron and steel. The following is an extract from the report of the secretary of the association, J. Stephen Jeans, with omission, however, of certain figures which have already been published in this JOURNAL (March 30, 1905, p. 619; and April 13, p. 709).

The general condition of the British iron industry during the first eight months of the year was decidedly poor, as during this time both export and import decreased and prices fell, while the competition of other countries was strongly felt, both on the English and on the world's market. The decline in the home consumption is ascribed principally to the depression prevailing in the shipbuilding trade, and to the disinclination of the railway companies and other large consumers to spend any large sums. The war troubles in the Far East, and especially the fear that the war might spread further, are supposed to have exerted a sobering influence on the business. The English commerce in iron and steel with foreign nations during the years 1903 and 1904 is shown in the following table:

	1903.	1904.
Value of crude iron imported..	£576,996	£560,753
Other iron and steel imported.	8,085,485	7,654,802
Machinery, etc., imported.....	9,588,200	9,569.520
Scrap iron and steel imported.	50,642	60,751
Crude iron exported.....	3,360,430	2,374,656
Other iron and steel exported..	27,038,831	25,708,036
Machinery, etc., exported.....	20,058,206	21,082,502
Hardware, tools, etc., exported.	4,638,211	4,882,359
Ships, automobiles, cycles, etc.. exported,.....	7,195 200	7,824,520
Scrap iron and steel exported.	442,108	482,369

The total foreign trade has fallen by £834,014, as compared with 1903.

The total value of the English imports of iron ore in the year 1904 amounted to £4,538,187, as compared with £4,837,146 in the preceding year. The value of the imports from Spain, compared with those from other countries, is as follows:

	1903.	1904.
Spain.....	£3,700,537	£3,348,799
Other countries	1,136,609	1,189,388
	£4,837,146	£4 538,187

The total quantity of ore mined in the British Isles amounted to 131994,671 tons in 1904, as compared with 13,935,095 tons in the preceding year. The total import of iron ore was 6,198,368 tons, of which 6,146,604 tons were derived from foreign countries, and 51,764 tons from British colonies. The corresponding figures for the preceding year are: Imports from foreign countries 6,351,195 tons, imports from British colonies 64,093 tons. The distribution of British iron-ore imports among the different nations supplying the same, is shown in the following table:

	1902. Tons.	1903. Tons.	1904. Tons.
Sweden	169,756	248,919	242,068
Norway..	634	125,589	286,372
Germany.....	8,092	2,207	2,575
Holland.....	14,578	10,389	11,633
Belgium	5,675	9,001	9,561
France.	67,231	132,159	175,717
Portugal.....	17,509	15,812	6,142
Spain.....	5,394,689	5,024,207	4,722,708
Italy.....	184,966	112,976	.....
Greece.....	341,197	321,714	350,068
European Turkey..	4,089	4,497	7,072
Asiatic Turkey.....	4,031	30,668	2,847
Algiers.....	219,082	226,181	241,548
Persia	1,709	829	2,480
United states.....	43	.....	5,402
Other countries....	9,461	85,948	80,411
Total from foreign countries.	6,442,732	6,351,096	6,146,604
From British colonies.....	.....	64,093	51,764

In 1903 there were worked up in all 20,896,209 tons of ore, of which 13,935,095 tons were produced by domestic mines, 6,415,189 tons were imported, and 560,765 tons represent residues from copper extraction; while on the other hand 14,838 tons of exported ore must be deducted. The corresponding figures for the year 1904 were:

	Tons.
Domestic production.....	13,994,671
Foreign ore imported	6,198,368
Pyrites cinders.....	566,042
	20,759,081
Deduct export of domestic and foreign ore	13,927
	20,745,154

The average price of the English iron ores is subject to considerable fluctuations, and depends largely on the demand, and hence on the momentary state of the market. It was lower in 1903 than in any previous year, viz.: 4s. 8d. per English ton, as against 4s. 10d. in 1902 and 6s. in 1900. The highest average price for a year ever attained was 9s. 8d. in 1873.

The quantity and value of manganese ores imported into England for the last seven years was as follows:

	Tons	Value per ton
1898.....	156,390	£2.20
1899.....	261,730	2 27
1900.....	270,009	2.57
1901.....	195,736	2.38
1902.....	237,066	2.09
1903.....	235 574	2.10
1904.....	208,468	2.46

The production of crude iron and steel was reported in this JOURNAL, March 30 last. The production of bessemer-steel rails amounted to 931,036 tons in 1904, as compared with 1,078,423 tons in 1903 and 917,666 tons in 1902. The total production of rails was 951,208 tons in 1904, as against 965,599 tons in 1903. It has therefore decreased by 14,391 tons, while the decrease in 1903 was 38,491 tons.

Sulphate of lime in portland cement is the subject of investigations by Dr. Framm, which were presented at the last meeting of the German Cement Manufacturers' Association. The conclusion seems to be that a greater addition than 3% is injurious both in water and in air, a larger proportion causing expansion which will take place more rapidly in air than in water. However, this may be more or less affected by the method of preparation of the raw materials.

Bentonite in Wyoming.

The bentonite [clay] deposits of Wyoming are described by C. A. Fisher in Bulletin 260 (U. S. Geol. Survey, "Contributions to Economic Geology, 1904"). A peculiar variety of clay found in this region is named after the Benton formation, which has a wide distribution throughout the Northwest.

Bentonite is a hydrous silicate of alumina, a clay that possesses extraordinary physical properties. Its resemblance to ehrenbergite of Germany was noted by the late Prof. W. C. Knight, of the Wyoming State School of Mines. Bentonite has been found in large quantities in Wyoming. It has been reported from Crook, Johnson, Weston, Converse, Natrona, Carbon, Albany, Laramie and Bighorn counties.

The extensive deposits of bentonite discovered by Mr. Fisher are in the northern part of the Bighorn basin on Dry Creek, about 8 miles east of Frannie, Wyo. They have a total thickness of 11 ft., distributed through a vertical range of 100 ft. The thickest layer is about 7½ ft. thick. Below the bentonite series beds of dark shale abound, containing bands of iron concretions. The material is a gray, fine-grained, massive clay, of green and yellow tints. Thin seams of gypsum are present in other localities, though not conspicuous.

Bentonite has been used in the manufacture of some of the higher grades of soap. The clay gives to the soap a certain weight and body which is considered desirable. It has also been found valuable as a packing for a special kind of horseshoe and as a diluent for certain powerful drugs sold in powdered form. Small quantities are used as an adulterant in making candy, after the alkali associated with it has been removed. In this condition it closely resembles terra alba, which is generally used. Owing to its high absorption, its use in the manufacture of dynamite has been suggested. Other uses have also been proposed, such as for loading paper and for adulterations of various kinds.

The mining of bentonite has been carried on in Wyoming since 1888, although the output has at no time been large. Prior to 1896 William Taylor had shipped 5,400 tons from his quarry near Rock Creek station. This material was sold at $25 a ton, making a total value of $13,500. The material has at present a market value of about $5 a ton.

B. Wagner, in Fr. Pat. 350,579, Jan. 7, 1905, states that a material suitable for briquette making can be obtained by heating separately the chief constituent, *e. g.* anthracite, at about 140° C., and the binding material, which may consist of the residues from cellulose manufacture, at about 60° C. The materials are then mixed in a triturating trough at a temperature of about 100° C., and pressed.

The Schorr Briquette Press.

BY ROBERT SCHORR.*

In this press, two soleplates with heavy bearings are arranged to carry a stationary steel shaft, upon which a large spur-wheel revolves. This is driven by means of gearing, a countershaft and friction-clutch pulley. The spur-wheel rim is made integral with a mold-ring, which has a series of holes and sliding plungers (pistons) therein. The holes or molds are fitted with phosphor-bronze bushings. The pistons are under the continuous control of cams, which are supported by heavy shields. When the final pressure is applied, the pistons are released from the camway by means of a large wheel with steel tire, pivoted between two levers. This wheel is pressed against the piston heads by means of an adjustable spring, which allows the pressure to be regulated. After leaving the pressure wheel, *i. e.*, after the briquette is made, the plungers are gradually forced forward to eject the briquettes; these drop upon a vibrating discharge chute. There is ample time for the briquettes to fall off, but if one or the other sticks to the piston it is forced down by a hard rubber piece fastened to one of the shields.

From this point the pistons are gradually withdrawn, and, in passing the feed-box, the cavities are filled with the coal mixture. The filling of the molds, when operating at a higher speed than 5 r.p.m., is materially aided by a distributor, which is operated from the press. At the end of this feed-box all surplus material is scraped off by a steel plate. After passing the scraper plate, the pistons are gradually forced in, pressing the material against the resistance block, which is supported by the main shaft. This pressing is effected by a cast-iron stand with phosphor-bronze liner.

When the pistons are about ½ in. from their terminal, they strike against the rocking-pressure wheel and are forced home. In this way the briquettes are made and the cycle of operations repeated with every revolution.

The machine is self-contained and not apt to be wrecked by over-feed or obstruction. Up to the present time two press designs have been made, the one with two rows of 2-in. cylindrical molds, and the other with two rows of 2½x2¾-in. rectangular shapes with rounded corners. There is no difficulty in making other and heavier shapes. It offers no complications to have more than two rows of molds, and consequently this type of press can be built for a very large capacity. Should the market for briquettes be limited for some months in the year, the capacity can be cut down without requiring any change in speed or otherwise. There are 80 to 110 briquettes made per revolution, depending on their size.

The press requires 4 r. p. m. to make 5 tons of ½-lb. briquettes per hour; if a 1-lb. briquette is desired, the capacity per hour at the same speed is six tons. For this output 12 to 13 h.p. is required to drive the press. The floor space covered is 4x10 ft., and the height above foundation is 4 ft. 6 in. The driving gear is below the floor-line. The first press was completed in April and gave satisfaction from the start. It is used in the Western Fuel Co.'s new briquetting plant, at Oakland, near San Francisco. This press is belted for 4.63 r. p. m., and it is stated that the molds will fill completely at a higher speed. The briquettes are uniform in size and branded with a "W." The lubricating is done by an air-compressor.

The machine is especially adapted for the manufacture of small briquettes, and the use of such in preference to large blocks is obvious. Small briquettes can be readily shoveled into furnaces or fed automatically, while the large ones sometimes have to be broken up first, causing labor, waste and dust. For this reason small briquettes are preferable both for domestic and industrial purposes.

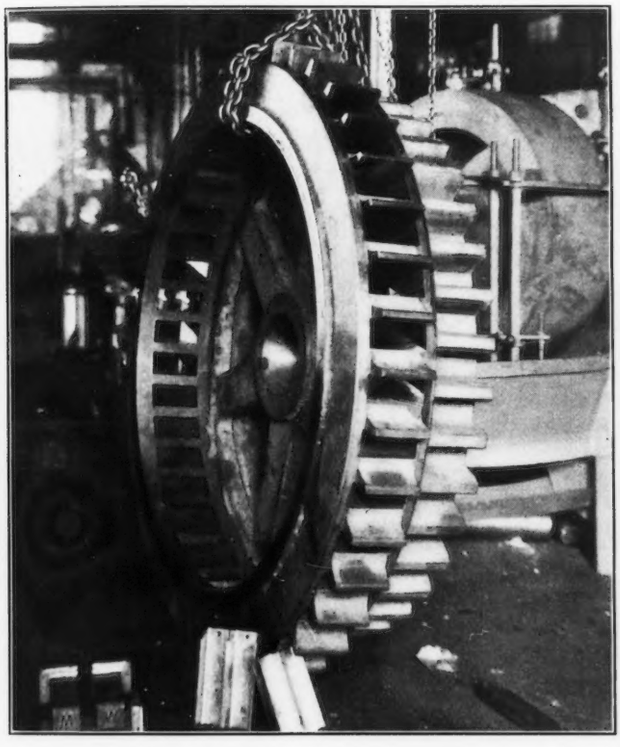

FIG. 1. MOLD-WHEEL OF BRIQUETTING PRESS.

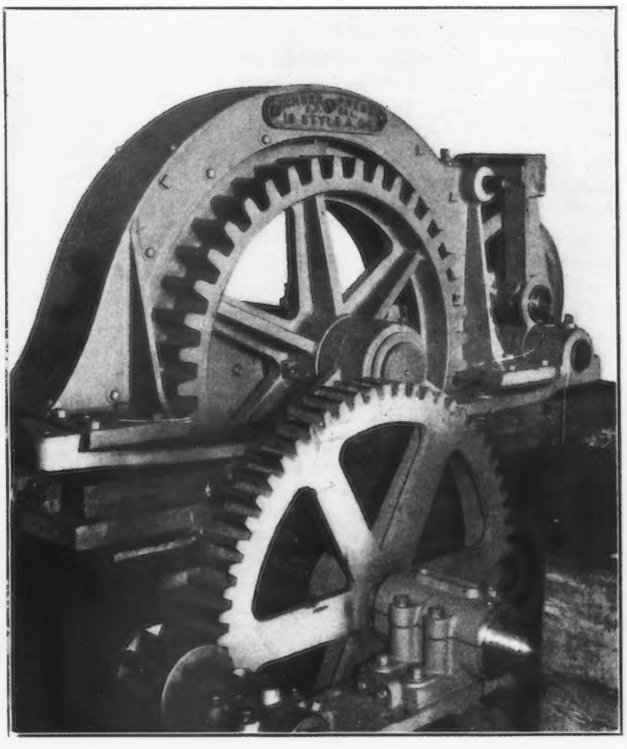

FIG. 2. MACHINE ASSEMBLED IN SHOP.

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J. S. MacArthur, Glasgow, in Eng. Pat. 11,123, May 14, 1904, proposes to treat comminuted ore containing antimony with a solution of a fixed alkali hydroxide, such as sodium hydroxide, of not more than 4% strength (and, preferably not more than 2% unless the ore contains oxide of antimony) at a temperature exceeding 50° C. The filtered solution is precipitated by carbon dioxide, the reaction being assisted by cooling. The precipitate is collected in a filter-press, and the filtrate, containing (say) sodium carbonate, is causticized by lime for further use. The process is claimed to be particularly applicable in the treatment of ores containing antimony in the form of stibnite.

The Hoisting Problem.*

BY J. R. THOMPSON.

The hoisting problem is an ever present one with the miner. The conditions vary with different districts, and indeed, each individual mine seems to receive, even if it does not require, an independent treatment. It is not strange then that the practical solution of the problem in the Lake Superior mining region should have produced an immense variety of hoisting machinery. Puffer hoists, oscillating, slide-valve and Corliss engines, first-motion and second-motion plants, hoisting in balance and out of balance, single drum and multiple drum, hand-handled, power-handled, plants built for 150 ft. depth, plants built for 5,000 ft. depth, plants forced to work far beyond their capacity and constantly on the verge of break-down, plants installed to discount a magnificent future working at a mere fraction of their capacity, plants built regardless of steam economy, plants built for the extremest economy of steam consumption regardless of first cost—all these and more are easily found.

Hoisting practice in the Lake Superior districts largely, but perhaps unconsciously, conforms to a certain standard of speed. There are important exceptions, both faster and slower, but plants which nearly conform to the standard practice have the reputation, usually, of being successful plants. This speed standard may be stated as follows, viz.: No matter what the depth, the load must be hoisted from the bottom of the mine within 1 min. and the round trip take only from 2½ to 3 minutes.

This seems on first statement to be an exceedingly arbitrary standard, but the fact is, that the second-motion hoists installed at the iron mines of from 300 to 800 ft. depth have roughly conformed to it no less than the big Nordberg quadruple engine hoist at Tamarack, with drum 25.5 ft. in diameter, hoisting from approximately 5,000 ft., and making from 18 to 20 trips per hour. A duplicate of this hoist is now being installed, which certainly indicates that the first one satisfied the requirements of the mine's underground work. Practice at the Quincy, unless recently changed, is the same. Coal mines, which usually screen their coal at the top of the shaft, are apt to drain a large territory to one shaft, and with lighter loads hoist more rapidly, often reaching the rate of a round trip per minute from a depth of 500 or 600 ft. It might be expected that the large iron mines, especially as they gain depth, would reduce the number of operating shafts and require a more rapid rate of hoisting. Observation of the shafts projected, however, and hoisting facilities planned leads to the conclusion that the rate of hoisting as stated will satisfactorily handle the required production for an indefinite time to come.

The loads hoisted have varied from one ton in the early days of shallow mines to a maximum of five tons in the iron mines and of 7.5 tons in the copper district. It has evidently been found wise to increase the product by increasing the load hoisted rather than by increasing the rate of hoisting.

In considering the engineering and mechanical phase of the problem, many questions arise. The first element to be considered is that of power. Late practice uses about 150 lb. steam pressure. This is somewhere near the limit at which ordinary standard pipe and fittings and ordinary workmanship are satisfactory. This pressure moreover, as compared with 100 lb., until recently the maximum carried, gives a 50% increase of power with less than 5% increase of coal consumption. Such increased power means smaller engines and hence a lighter construction throughout, a distinct advantage in first cost of plant. To derive such a large increase of power with so small an added expenditure for fuel means an increased economy of operation which can perhaps be duplicated in no other manner. There is then every reason in favor of designing an up-to-date hoisting equipment for 150 lb. steam. In a recent case, the saving in first cost possible by designing the plant for 150 lb. steam instead of for 100 lb. was sufficient to have installed a new boiler plant complete, designed for the higher pressure, to say nothing of the further economy of operation after the higher pressure equipment was installed.

In ordinary power plants the means of arriving at ultimate economy are well understood and commonly practiced. Where considerable steady power is required the advisability of installing compound condensing or triple-expansion condensing engines is unquestioned. The duty required of a hoisting plant, however, is peculiar and the ordinary treatment does not necessarily fit the case.

The load upon a hoisting engine consists of the weight of the ore, which is the total live load; the weight of the cage and car, which is a constant unvarying dead load; and the weight of the rope, an important percentage of the whole, which is a dead load constantly varying in amount, being greatest at the beginning of the hoisting trip and nothing at the end. Added to this variable and largely unprofitable loading of the engines is the extremely intermittent character of the service required. The engines must start the maximum load, attain full speed in six or seven revolutions, hoist a constantly decreasing load to the surface and stop short—all within one minute, and after a longer or shorter period of idleness must repeat the operation.

Under such conditions the ordinary methods of obtaining economy in steam-engine practice are insufficient, if not positively worthless. Lake Superior experience has fully demonstrated that a simple Corliss engine, or other engine of automatic variable cut-off, gives more economical results than a slide-valve or fixed cut-off engine, and such engines have usually been adopted for hoisting plants of any considerable size. The results of the attempt to gain a still greater economy by the use of compound or triple expansion engines are somewhat indefinite, not to say negative. The subject is one of much practical difficulty, for the reason that no one knows definitely what steam is required by the various types of engines in actual hoisting service. Even the compound and triple engines must use steam non-expansively to start and rapidly accelerate the load, and as different plants and indeed the same plant at different times are handling loads which vary greatly in the proportion between the live and dead loads, it is impossible to estimate the steam consumption by the ordinary method. The boiler plant supplying steam for hoisting usually also supplies steam for pumping, air-compressing and other purposes, which renders it impossible to determine directly the amount of coal to be charged to hoisting. Even if this could be done, two plants are almost never sufficiently similar in working conditions to render an accurate and reliable comparison possible.

Lacking an accurate basis of knowledge, the impression seems to prevail, confirmed by the major part of the best hoisting practice, that it is useless to endeavor to reach a greater economy of steam consumption in hoisting plants than is attained by the simple Corliss engine. A cross-compound condensing hoist was installed at the Lake shaft of the Cleveland Cliffs company. A recent installation at the same mine is of the simple Corliss type. The Calumet & Hecla has apparently aimed at the extreme limit of steam economy in its hoisting practice, while the Quincy and Tamarack, not to mention many others, are continually installing hoists with simple Corliss engines. The beautiful Calumet & Hecla hoists, elegant in workmanship and finish as they are, have no general reputation of phenomenal economy in steam consumption. If they really have proved unusually economical, it would seem that some at least of the neighbors, operating under similar conditions, would have abandoned the simple Corliss engines for a more efficient type.

It is generally recognized that increased speed of an engine means increased power. Lake Superior hoisting practice, however, has generally, if not entirely, proceeded on the idea that increased capacity was to be gained only by an increase in the size of the drums, ignoring the advantage that might be obtained by increasing engine speeds. Its practice in that respect is somewhat behind modern engine design in other lines. The increase of engine speed would tend to lessen the size

*Abstract of a paper in *Proceedings* of the Lake Superior Mining Institute, Vol. X.

of the whole plant as well as of the engines required, and I think it safe to predict that, in the future development of hoisting practice, engines of higher rotative speeds will be used, and this important method of gaining increased capacity, moderate weight and low first cost of plant will not much longer be overlooked.

Owing to the nature of the load on hoisting engines many plans have been used, both for equalizing the variable weight of the rope and for so combining two single hoists that the dead weight of one load would counterbalance the dead weight of the other. The advantages of these various plans have been thoroughly discussed. It is not necessary to go over the same ground again in this paper, but it is desired to take up one important phase of the matter which seems to have escaped the attention it deserves. A typical hoisting problem, taken as an illustration, will aid in clearly presenting the idea. Assuming a vertical shaft 2,000 ft. deep, from which it is desired to hoist two cars each holding 2,000 lb. of ore on a double-deck cage, the load will then be made up as follows:

	Weight.	Per Cent of Total at Bottom.	Per Cent of Total at Top.	Average Per Cent of Total.
Ore	4000 lb.	32	47	39 5
Cars, cage and rope from sheave to bale	4500 "	36	53	44.5
2000 ft 1⅛ in. round rope	4000 "	32	00	16
Total load at bottom	12500 "	100		100 av.
Total load at top..	8500 "		100	

It appears, then, that the net load of ore is only 32% of the total load at the bottom, and 47% of the load at the top, an average of 39.5%. This means that, with an unbalanced hoist, about 60% of the total work done is dead work and only about 40% of the total work is efficient. In other words the engines must do two and one-half times as much work as would be needed if no part of the load were dead weight, or if all the dead weight were counterbalanced. If an ordinary balanced hoist is used, in which the cages are balanced while the rope remains unbalanced, the net load will average 66⅔% of the entire load as compared with 40% average net load with an unbalanced hoist.

Under these conditions a proper design for hoisting in balance is very important, but the question arises whether the most important direction in which economy can be obtained does not lie in reducing the proportion between the dead load and the live or net load. If the dead load could be entirely avoided the problem of securing an economical hoist would be reduced to that of securing the best engines for the purpose. The nearer that result can be reached, the more important becomes the engine and the less important the balancing features of the design. This is an essential feature because conditions are not always such that a balanced hoist can be used. Let us assume the same depth of shaft, but change the load to one of five tons and hoist it in a skip. We can then make up the total load as follows:

	Weight.	Per Cent of Total at Bottom.	Per Cent of Total at Top.	Average Per Cent of Total.
Ore	10000 lb.	57	74	65.5
Skip and rope from sheave to bale	3500 "	20	26	23
2000 ft. 1⅛ in. plough-steel rope	4000 "	23	00	11 5
Total load at bottom	17500 "	100		
Total load at top..	13500 "		100	100 Av.

The net load of ore is then 57% of the maximum load in place of 32%, and 76% of the minimum load instead of 47%, averaging 65.5%. This means that with an unbalanced hoist only one-third of the total work done, instead of 60%, is dead work, and that two-thirds, instead of 40%, of the total is efficient. Stated differently, the engines do only one and one-half times, instead of two and one-half times, the work necessary if none of the load lifted were dead load. Furthermore an unbalanced hoist under this assumption is practically as efficient as the balanced hoist under the conditions first assumed.

If now we assume that this plant is made to work in balance in the ordinary way we find that 83.3% of the total work done is consumed by the live load, and only one-sixth of the total work is used in lifting the dead load. In some cases it would be feasible to fully balance the dead load by attaching a balance rope to the bottoms of the skips extending from one skip to the other around a pulley located in the bottom of the shaft. With the addition of the balance rope the design of the hoist becomes theoretically perfect; that is, by this arrangement the entire effort of the engines would be utilized in lifting the weight of the ore and of the ore alone, the variable load of the engines would be overcome, and the only difficulty in attaining economy of steam consumption would be due to the intermittent nature of the duty required. The balance rope has, I believe, been lately installed on the Whiting hoist at the Red Jacket shaft of the Calumet & Hecla mine. So far as known it is used nowhere else on Lake Superior. With the exception of the balance rope, the latest and best Lake Superior hoisting practice largely conforms to the typical hoist conditions assumed above with the heavy load.

A table presented herewith, based on the live load as the unit for comparison, perhaps shows the differences of the two assumptions in a more graphic manner.

FIRST ASSUMPTION.

	Weight.	Bottom Load.	Top Load.	Average Load.	Ordinary Bal. Hoist.	Full Bal. Hoist with Bal. Rope.
	Lb.	%	%	%	%	%
Ore	4,000	100	100	100	100	100
Cage and car.	4,500	112½	112½	112½	...	...
Rope	4,000	100	...	50	50	...
Tot. on eng..	12,500	312½	212½	262½	150	100

SECOND ASSUMPTION.

Ore	10,000	100	100	100	100	100
Skip	3,500	35	35	35	...	...
Rope	4,000	40	...	20	20	...
Tot. on eng..	17,500	175	135	155	120	100

If a reduction of dead load results in such economy as indicated by the figures, the inquiry immediately arises whether the process may not be successfully applied to the plant itself. In Lake Superior practice increased hoisting capacity, either for depth or product, has very largely been obtained by increasing drum diameters, which has resulted in the common use of large drums even for very moderate depth. It requires no inconsiderable power to start, accelerate, move rapidly and then stop suddenly, a large and heavy mass of machinery. It certainly requires less power to handle small machinery than it does to handle large.

If the facts are as stated in this paper, viz.: That in general, drum diameters alone have been increased to gain speed, and engine speeds have not kept pace with other practice, it is evident that improvement along the lines suggested should be possible.

In hoisting in balance in a mine with many levels or of constantly increasing depth, it is usually desirable to use two drums which can be operated independently or in balance as desired. The width obtained by the usual construction, placing two small drums carrying so large an amount of rope, end to end, on one shaft, would cause the ropes to lead from the head sheaves to the drums at an undesirable angle, unless the hoisting plant were situated a long way from the shaft. The question of rope lead under some circumstances, such as are often found in the western mountainous mining region where level space is scarce and valuable, has undoubtedly led to the general adoption of the flat-rope reel-hoist, because the rope always leads in one line from the reel to the head sheave. Under ordinary circumstances, where room is not so great a consideration, the worth of a single 6-ft. drum, carrying 2,000 ft. of rope, say, 11 ft., is not sufficient to cause an undesirable rope lead, with the hoist reasonably near the shaft. Where two drums are necessary, the advantages of the small drum design, on the score of greater structural strength and lower first cost of plant, are sufficient to warrant its adoption wherever possible. The difficulty of the rope lead is easily overcome by placing the two

drums side by side on parallel shafts, instead of end to end on a single shaft, driving them by sidebars like the side rods of a locomotive. Second-motion plants are often designed with two drums, mounted on separate parallel shafts, and the driving pulleys of Whiting hoists are operated with the side rods as suggested. So far as I am aware, no first motion-plant, hoisting with drums, has ever been constructed in this manner. The benefits of securing a satisfactory hoisting plant (which would weigh much less and cost much less for the plant itself, as well as requiring much less expensive foundations and building) should abundantly justify an unusual construction and especially a construction to which there can be no mechanical objection.

Furthermore, the small straight-drum design, driven by high-speed engines, has all the advantages sought to be obtained by a conical-drum design, viz., ability to start the load with engines of reasonable size and a sufficient rope speed for the hoisting capacity desired. The Whiting system of hoisting has recently been advocated for deep hoisting, on the ground that the tail rope hanging from the bottom of the cage renders the load on the hoist uniform and enables more economical engines to be used to advantage. The tail rope could be used on an ordinary balanced hoist as well as on a Whiting hoist. Equally efficient engines could be used on the one as on the other. Considering the many turning sheaves used by the Whiting system, the slippage of the rope on the driving pulleys and the cumbersome method of adjusting the hoist to varying conditions, it is difficult to think that it has any advantages over the ordinary type of balanced hoist, with two drums which may be used independently or connected in balance as desired.

In recent history on the Mesabi, three properties, with practically identical conditions, purchased hoists. One paid $1,400, the second $2,600 and the third $4,600. Under their conditions the costs were not vitally important; but in considering a larger plant the question of spending $14,000, or $26,000, or $46,000 for a hoisting plant is of great importance, and the choice of the higher plant should rest on stronger grounds than mere personal preference. When should a hoist costing $26,000 be purchased instead of one costing $14,000, assuming that both would hoist the required amount of ore? The answer is evident: When the definite saving in the cost of operation of the expensive plant is sufficient, during the time it is being used, to pay the whole of its additional cost, and a good rate of interest on the same. Otherwise the more costly plant is a source of unnecessary expense. Many plants on Lake Superior have been installed too large for present needs, with the idea of making them large enough for many years of added development. It is doubtless true in many instances that the interest charge on the extra cost of such plants during the years they were being operated below their economical capacity would more than pay their entire cost when plants of such capacity became really needed. The attempt to make a single installation serve both present needs and possible future requirements may easily be overdone. A desire to discount the future should not be allowed to unfit the plant to meet the present known conditions in the most efficient and economical way.

From the standpoint of the purchaser the following conclusions may be drawn as to the requirements to be met by an ideal modern hoisting plant.

It should use at least 150 lb. of steam pressure, because of the smaller size and cost of engines to give the required power, and because of the fuel economy gained by using that pressure instead of lower pressure.

It should hoist the load from the bottom in 1 min. and make a round trip in less than 3 min., no matter what the load or depth of shaft.

The live load should be as large as possible in proportion to the dead load, and the mass of moving machinery should be kept as small as possible.

The most perfect plan of balancing feasible under the individual circumstances, should be used.

A plain Corliss or other automatic, variable cut-off engine should be used, since the best present practice indicates that no other type of engine will give greater economy in hoisting service.

It is desirable to use engines of as high rotative speed as is found practical in other lines of engine practice.

The drums used should be as small as possible for the required hoisting speed and capacity, when driven by high-speed engines.

Straight drums should be used, as there is no advantage over small drums and high-speed engines to be gained by special designs of cone drums, rope reels, or other hoisting systems.

The ideas advanced here have been confirmed by practical experience, the principal features of the assumed plant being actually embodied in an existing hoist, designed by Howard Greer, Jr., of Chicago, and located at the "K" shaft of the Newport mine. This shaft has two hoisting compartments in its lower portion only. The mine had developed beyond the capacity of the old plant, without warranting the expense of stripping the balance of the shaft so as to have two hoisting compartments throughout its length. A first motion plant with a single drum, capable of hoisting a net load of five tons from a depth of 2,000 ft., was therefore decided upon, but so designed that whenever the shaft should be stripped so as to allow hoisting in balance, a second drum could be added on a second shaft parallel to the first, and driven by side rods from the driving disks of the first drum. The drums were intended to work either independently or clutched in balance, as desired.

The engines and first drum were put in service in January, 1904. The drum is 6 ft. in diameter by 11 ft. long, built with three spiders, entirely of steel except the drum shell, which is of cast iron. This construction not only makes a drum of light weight, but one which is very rigid and well able to stand the shocks of service with so heavy a load. The engines are 20 by 42 in., using 150 lb. steam pressure and designed for a speed of 116 r. p. m., giving a rope speed of 2,200 ft. The engine frames are very rigid, with 7 holding-down bolts, all practically strengthening the fastenings of the main pillow block, and all other parts are designed of extra strength and very large factor of safety.

In regular work, hoisting 8,000 lb. from a depth of 1,500 ft., with the rope speed reduced to 1,600 ft. per minute, we have been able to hoist continuously over 900 tons per day, while the plant was apparently working at about three-quarters of its capacity under those conditions. The plant weighed only 101,000 lb. and there are probably few, if any, plants in existence hoisting an unbalanced load so large in proportion to its own weight.

The old second-motion plant, hoisting a 4-ton load with a 6-ft. drum, was satisfactorily handled by hand power, and we therefore equipped the new plant with hand-handling gear to reduce the first cost. The new first-motion plant, however, was so much quicker and more powerful in its action as to render quick-acting steam-handling gear desirable. When the plant is completed, by the addition of the second drum, it will also be equipped with power-handling gear throughout. With this exception, the plant has given entire satisfaction, and we think has demonstrated, for deep hoisting, the feasibility of using straight drums, smaller in diameter, but driven by engines of higher speed than has been the common practice.

Lead and Zinc in Queensland.

The output of silver and lead in Queensland comes chiefly from the Chillagoe smelters, which in 1904 produced 357,196 oz. of silver and 1,661 tons of lead, the lead furnace being chiefly fed by the Girofla mine, at Mungana, and by the Crooked Creek silver-lead mine, near Almaden. The latter has developed into a mine of considerable proportions; a series of levels and crosscuts has exposed a solid mass of galena, which in some places is more than 50 ft. wide. An extensive concentrating plant has been erected, and the product is sold to the Chillagoe company.

The Silver Spur mine, at Texas, has been proved to have a large body of zinc sulphide ore, which goes roughly about 35%, and can be hand-dressed to 44%.

Use of Concrete in Coal Mining.*

BY M. PIFFAUTE.

At the mines of Perrecy, in Burgundy, where a thick coal seam is worked by the method of horizontal slices taken from above downward (the excavation being completely filled with waste rock) a method of interposing a sheet of concrete to carry each successive layer of packing has been in use for about three years, the object being to avoid the loss of coal incurred when a certain thickness is left overhead. This plan is generally found necessary, to protect the lower working from falls either by movement of large pieces or crumbling of the packing above, as well as to keep the coal free from admixture with the fallen dirt.

In laying out the slice of coal for removal the floor is cut out to a depth of about 12 or 14 in. below the level of the working gallery, to afford room for the rails and sleepers, and on this about 1½ in. of clean coal dust is laid, forming a bed for the concrete layer of 8 to 10 in. thick. This is laid in strips parallel to the working face, as the coal is removed each strip being moulded to a feather edge by running against a board cut to an edge of 45°. The concrete is made of hydraulic lime and steam-boiler clinkers, in the proportion of 280 lb. of the former to 35 cu. ft. of the latter. The mixing is done by hand, the ballast being used without crushing or sizing otherwise than breaking up extra large pieces to a more convenient size.

The timber along the working faces is not removed, and a layer of small waste is placed above the concrete before finally filling up the excavated ground. The time required for the consolidation of the concrete varies with the hygrometric condition of the working place, but it rarely exceeds two of three months. In one case a working place 50 ft. wide was opened out under a concrete roof that had only been laid a month. The small coal packing is important in two ways—first as preventing the coal from being mixed with any stony material from the concrete, and secondly by filling hollows and irregularities in the floor to give a smooth bearing for the concrete. The cost of the concrete is given as 3 francs per cu. m. (35 cu. ft.) which for a standard thickness of 10 in. will cover 4 sq. m. (43 sq. ft.). As the average yield of coal is about 3½ tons per sq. m. the extra cost of the concrete, including 10 centimes per sq. m. for laying, works out at 24 centimes per ton. This, however, is largely compensated by the reduced outlay on timber and the greater facility afforded for rapid working.

For breaking by hand stone that is to be used for concrete, 3-lb. striking hammers should be provided as being the most satisfactory size.

*Abstract of a paper in *Comptes Rendus* de la Société de l'Industrie Minérale, St. Etienne, 1904, p. 326.

Concrete Steel Chimney at Tacoma.

The chimney of reinforced concrete at Tacoma, Wash., a note regarding which was recently published in this JOURNAL (July 29, 1905, p. 145), is to be overtopped by a similar chimney at Portland, Oregon, for the General Electric Co. The structure is to be 203 ft. high and 12 ft. diameter.

Engineering News, from which the accompanying illustration is taken, states that the first chimney has an inside diameter of 18 ft. throughout, and that there is at the bottom an opening or smoke arch 10 ft. wide and 26 ft. high. For a height of 90 ft. there is a double shell, composed of a 9-in. outer wall and a 5-in. inner wall, separated by a 4-in. air space, with air inlets at the bottom. At 90 ft. there is a collar with expansion joint; above this

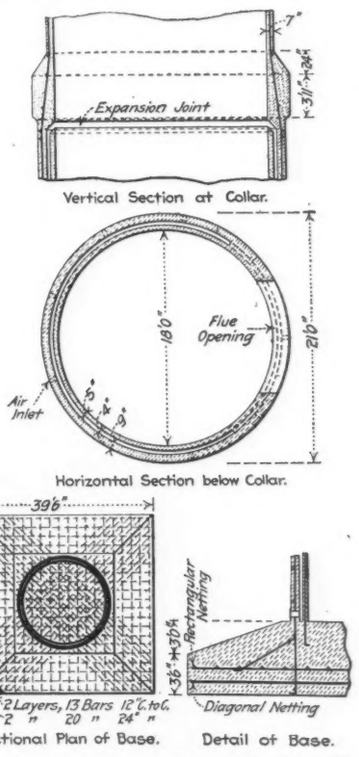

FIG. I. DETAILS OF CONCRETE-STEEL CHIMNEY.

there is a single shell 7 in. thick. The last 20 ft. of interior wall at the top is lined with lead, and this is also extended over the cap or coping.

The foundation is 39½ by 39½ ft. on the base, which is 6 ft. 6 in. thick; the concrete is reinforced by a rectangular network of steel bars and two sets of diagonal bars. The vertical bars of the chimney are embedded in this foundation, as shown in the illustration, and diagonal bars extend from the outer vertical bars to the horizontal bars. For a height of 16 ft. 6 in. from the base of the foundation there are 380 vertical bars; the number of these then decreases at 10-ft. intervals to a height of 180 ft., where there are 60 bars; then 40 bars for 20 ft.; 30 bars for 25 ft.; and 20 bars for the remaining 75 ft. to the top. To these bars are attached horizontal steel rings spaced 20 in. apart in the inner shell, and 36 in. apart in the outer single-shell portion of the chimney. The vertical bars are lapped at least 2 ft. at the splices and are interlaced with the bars in the foundation. The foundation bars and vertical bars are steel Ts, 1¼ by 1¼ by 3-16 in.; the rings are also of Ts, 1 by 1 by ⅛ in. The concrete is composed of 1 part Alsen cement, 3 sand and 5 gravel for the foundation; for the chimney the mixture is 1 part cement to 3 of sand. A combination mixer and hoist was used.

The total weight is 1,659 tons (including 75 tons of steel); the normal pressure on the ground is 1.063 tons per sq. ft. The stress sheet is figured for a wind pressure of 50 lb. per sq. ft. (equivalent to a velocity of 110 miles per hour); only the outer shell and single shell are considered in the wind strains, the inner shell having steel reinforcement to take up temperature strains. There is a large factor of safety in both tension and compression, and neither the tensile strength of the concrete nor the compressive strength of the steel are considered. Openings are specially figured, and an excess of strength is allowed in these sections. The foundation is three times the theoretical width and is very heavy, bringing the center of gravity of the whole structure very low.

The chimney was built in 3-ft. sections; an average of 3 ft. per day was made in the construction of the double section, and 6 ft. per day in the single or upper section. Sectional molds were used, and the work was handled from the inside by means of a scaffolding built up with the chimney. Materials were raised by means of a cable attached to the drum of the engine operating the concrete mixer.

The Contracting Engineering Co., of Tacoma, and the Weber Steel-Concrete Chimney Co., of Chicago, Ill., handled this work for the Tacoma Smelting Co., for which it was erected.

A new method has been devised for testing the viscosity and the internal frictional resistance of lubricating oils at various temperatures. The apparatus consists of a circular chamber in which rotates an agitator, resembling the vanes of a centrifugal pump. From each side of this chamber rises a pipe (the pipes connecting with the chamber) at the center of its height. The chamber is set on edge. The oil to be tested is poured into the apparatus until it fills the chamber and rises a little distance into the pipes, which are fitted with glass tubes so that the oil can be observed. Means are provided for heating the chamber. The power absorbed by the motor in driving the agitator, together with the height of the oil in the tubes and the temperature of the oil, gives a basis for the comparison of different oils.

The Asphyxiation of Blast-Furnace Workmen.*

BY B. H. THWAITE.†

With the rapidity increasing application of blast-furnace gas to power purposes there has arisen a need for the adoption of measures for the protection of workmen who may be subjected to its influence, as its chief thermal constituent, carbon monoxide, is highly toxic.

The action of carbon monoxide on the human system is cumulative, its absorption depending largely upon the length of time the subject is exposed to its influence. Its presence in the atmosphere in small quantities may be attended with consequences as serious as those which ensue, in short periods, in an atmosphere more highly charged, as shown in the table. When fatal effects are produced, a state of coma precedes death, which is due to asphyxia.

Volumetric Percentage Proportion of Blast-Furnace Gas in Air.	Ratio in Volumes of Furnace Gas to Air.	Symptoms Produced After One Hour's Exposure.
Per Cent.		
0.2	1 in 500	Giddiness.
0.35	1 in 286	Inability to walk.
0.70	1 in 143	Loss of consciousness.
1.00	1 in 100	Dangerous.

Putting aside the danger of asphyxiation, there appear to be no particular disadvantages to health associated with the industrial use of blast-furnace gas and producer gases.

Furnace and Producer Gases.—The poisonous properties of furnace gases being realized, it is useful to establish a comparison between this gas and other combustible gases in common industrial use (see Fig. 2). Producer gas, made from bituminous coal, is not attended with the same degree of risk as with the ordinary gas from coke-fed furnaces or with gas generated from anthracite, coke, or other fixed carbon fuels.

Certain Physical Properties of Furnace Gas.—Crude blast-furnace gas is fairly visible, and has a perceptible odor. Even when freed from suspended matters, but still carrying a proportion of water vapor, it is distinctly visible on escaping into the air, because the condensed vapor confers upon it a mist-like appearance. When the gas is thoroughly freed from suspended matter and moisture it is practically invisible and inodorous, and in this condition can permeate the atmosphere without its presence being detected by sight or smell.

The Permeability of Bricks, etc.—It is well known that gaseous fluids can penetrate brick walls. Marker and Schultze found that the permeation of air per minute through 1 sq. yd. of wall (the temperature difference between the sides being only 4° F.) varies from 4.7 cu. ft. in sandstone to 7.9 cu. ft. in brick. Mortar made of sand or lime is also very porous, and gases easily flow through it.

The permeability of hot gases, owing to their high tenuity, will naturally be greater than it is when the gases are at a lower temperature. An increase of 480° would probably permit the gas to flow one and a half times as fast, although the weight would be constant. Of course the pressure of the atmosphere will have some influence on the degree of permeability.

Permeability of the Subsoil.—Ordinary soil offers little resistance to the flow of gases. Pettenkofer mentions an instance in which several persons were asphyxiated in a house from a leaky underground gas main located 49 ft. distant. The author has had experience of fatalities due to the permeation of blast-furnace gas through subsoil. In one instance the ground was comparatively moist outside the building, but still it was permeable. In proportion as the soil is saturated with moisture, or is clayey, the degree of permeability will be less. When the subsoil is desiccated by proximity to a flue, it becomes as permeable as a sieve.

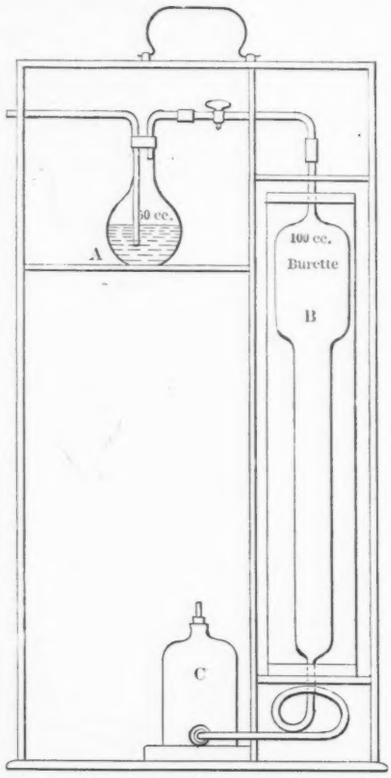

FIG. 1. APPARATUS FOR THE ESTIMATION OF CARBON MONOXIDE.

Crude furnace gas, in flowing through the subsoil, becomes purified by filtration, and is all the more dangerous. If there is any habitable structure overhead it will almost certainly find its way thereto, especially if this structure has a fireplace or heating apparatus.

The subsoil immediately beneath any habitable place will generally be drier than that of exposed open-air places, and the furnace gas escaping from a gas flue, following the direction of least resistance, will flow into such drier part of the subsoil and then enter the building above it.

Power-Development Purposes.—There is not the same danger of asphyxiation associated with the use of gas in steam-boiler flues as there is in its direct use in internal-combustion engines. In the former the chimney pull prevents the escape of the gas into the open air. The only danger is the possibility of the gas setting back when the chimney pull is inadequate.

The use of furnace gas in internal-combustion engines involves that the carbon monoxide proportion be some 14 or 15% of the mixture, and that it shall be compressed to some six or seven atmospheres before ignition. If the glands or pistons of the engine or the air valves are not sufficiently tight to prevent the escape of the compressed mixture, it will enter the engine room insidiously, and as the purified gas is almost invisible and odorless, it will change the air rapidly in the immediate proximity to a dangerously toxic condition. Therefore gas-engine houses should be especially well ventilated.

Another possible source of carbon monoxide danger is the position of the exhaust terminal. If it is at a low level the gas may hang about, the remedy for this being that the exhaust pipe or chimney terminal should be at a high level; a lofty steel chimney shaft is the best appliance.

Emission of Gas from the Slag-Notch.—The flow of gas at the end of the slag-tapping period varies, and so does its chemical composition, but the gas is capable of accumulating in dangerous quantities near the furnace-bosh, and it is therefore inadvisable that isolated workmen should be allowed to operate near to the bosh during the blow-out period of slag-tapping.

Detection of Carbon Monoxide.—Dr. Haldane suggests that mice kept in small cages for the purpose, provide a convenient and infallible method for testing the presence of carbon monoxide. Toxic indications would be rapid in proportion to the smallness of the weight of the blood and the extent of the circulatory system. Caged birds also would provide a ready indication of carbon monoxide without involving the loss of their lives, because if they are covered with sand, after exposure, they recover.

I have had an apparatus, shown in Fig. 2, designed to permit the rapid detection of the presence of carbon monoxide in air. It is arranged to provide a rapid method of utilizing the property of palladium chloride, in contact with carbon monoxide, of precipitating carbon. The method is as follows:

Introduce 50 c.c. of palladium chloride (one-thousandth normal strength) into the wash-bottle. Fill the burette with 100 c.c. of the suspected air, then slowly raise the water-bottle *C*, enough to displace the air in the burette,

*Abstract of a paper presented at the annual meeting of the Iron and Steel Institute, in London, in May, 1905.

†Consulting engineer, London, Eng.

and force it through palladium chloride solution in the wash-bottle. If a black precipitate is noticed at the bottom of the wash-bottle, it will indicate the presence of carbonic oxide approximately to the toxic danger extent of 1 per cent.

Leakage of Gas Mains.—Those familiar with crude furnace gas can recognize its presence by its odor, but once the gas has diffused through the subsoil, it will be found to have little, if any, smell. In testing the approximate locality of the leakage of an underground furnace gas main, the author has successfully employed acetylene gas.

Remedies in Cases of Asphyxiation.—It would be an excellent plan, were a paid ambulance corps organized for every iron and steel works of any importance. Oxygen should be stored in rope-entwined bottles, but with additional and distributed supplies in bags, kept under slight pressure and ready for emergencies. The administering of the oxygen should be gradual, and the same precaution should be exercised in removing the asphyxiated victim into fresh air; a sudden accession of the oxygen element may bring on syncope. A strange remedy still in vogue is to place the mouth of the asphyxiated victim over a hole cut in the open ground. Another modification of this curious practice is to place the face of the victim against the face of newly cut turf. An instance is recorded where a victim of asphyxiation was restored to life from a condition of coma of many hours' duration. It is obvious that no liquids must be administered to an asphyxiated person until respiration is re-established.

A Home Office memorandum, drawn up by the chief inspector of factories, has been issued, in which it is pointed out that respirators are of no avail against carbonic oxide poisoning, and emphasizing the danger of exposing victims to cold. The following suggestions have been drawn up by the author, with a view to securing comparative immunity from fatalities due to asphyxiation:

1. Where practicable, all gas-flues and gas-pipes should be placed above the ground, and, if possible, above the breathing level.

2. If the gas-flues are underground they should be built of blue bricks set in cement.

3. Gas-flue manholes should be equipped with lids that will secure the maintenance of perfect gas-tightness.

4. All habitable buildings should be thoroughly ventilated. The ground surface below the building should be covered with a layer of cement concrete, and an open-air space should be formed between the cement surface and the flooring boards of the building.

5. Forced ventilation should be the principle adopted for all occupied buildings in iron and steel works.

6. The gas-engine exhaust pipes should terminate at a considerable altitude above the works floor, and part of the air drawn into the air-tub of the blowing engine should be supplied from the engine-house.

7. Especial precautions should be taken during flue- and stove-cleaning periods, and in blowing-in furnaces.

8. Warning notices should be prominently posted throughout the works.

9. Fines should be imposed on workmen for gas risks carelessly undertaken.

10. A paid ambulance corps should be established.

11. During the blow-out period of slag-tapping operations the men should be withdrawn from the zone of gas-escape.

12. The time allowed to be occupied in gas-producer poking operations for individual men should be limited to 3 minutes.

13. The reversing valve-pits of gas-fired furnaces should be well ventilated.

14. Roll-call checks of labor employed in gas-flue and stove-cleaning operations should be established.

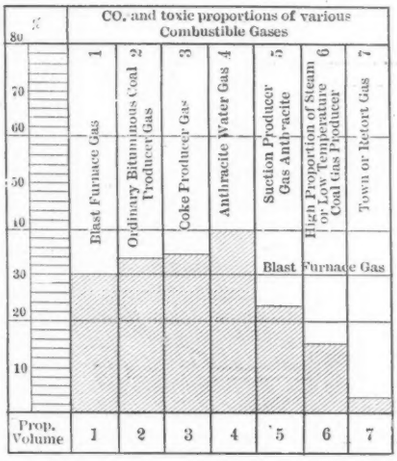

FIG. 2. TOXIC PROPORTIONS OF VARIOUS GASES.

15. If power gas-pipes have to be placed underground, they should be placed in grate-covered open trenches, and the pipe-flanges should be planed.

An interesting application of the alumino-thermic process, in the production of manganese, chromium, and iron compounds, has recently been described by Wedekind and Fetzer, who have thus obtained the borides, silicides, carbides, phosphides, antimonides, arsenides, bismuthides, and sulphides of these metals. This reaction also furnishes a ready method of preparing alloys of manganese with chromium, aluminum, and tin. The phosphide, antimonide, boride, and bismuthide of manganese, when thus produced, are magnetic, and in some cases the magnetism is so intense that the substances behave as permanent magnets. The boride and antimonide, having a very small electrical conductivity, may be regarded practically as being insulators. (*Chemiker Zeitung*, July 26, 1905.)

The Mount Morgan Mine.

The developments at Mt. Morgan, whereby the mine of that name is being converted from a great gold mine into a prospectively great copper mine are of extraordinary interest. The data presented in this article are taken from the report for 1904 of the Queensland Department of Mines.

An extensive system of diamond-drill boring revealed large bodies of copper-gold ore below the previous openings in the gold ore, sufficient to warrant the erection of smelting works capable of treating 10,000 tons of ore monthly, and estimated to cost about £220,000. The excavations have been begun, and the machinery will probably be erected and in operation by the close of the current year (1905).

The boring operations have shown that upward of 1,091,000 tons of copper-gold ore, containing 3½% of copper and 8 dwt. of gold, exist, in addition to about 1,500,000 tons of lower-grade ore containing a pay margin.

About 400,000 tons of over-burden was removed during 1904 by the steam-shovels and by contract labor, and a quantity of ore which would not have paid to mine by the more costly method of hand-shoveling has been uncovered, and on the eastern benches some ore of higher grade has been disclosed.

The product of the Mt. Morgan mine for 1904 was well in excess of that for the previous year, and the average value of stone treated during the former period compares favorably with that for 1903. From 232,052 tons of stone treated during last year by chlorination, 129,434 oz. of gold were obtained, and this was augmented by 4,658 oz. won from old tailings re-chlorinated, and by 3,910 oz. of fine gold contained in the copper, the resultant of the ore smelted. In addition to the foregoing returns, 6,567 tons of cupri-auriferous ore, put through the small water-jacket smelter, yielded 289.85 tons of copper. The precipitates collected during the year amounted to 215.8 tons, containing 167.1 tons of metal. The total value of the product of the mine thus amounted to £558,158.

The new smelting plant will consist of three water-jacket blast furnaces, each 190 by 48 in., with a minimum capacity of dealing with 10,000 tons of ore per month (there is also provision for the erection of two more similar furnaces if they should be required); two converter stands—with three vessels for each stand—with a maximum output of 600 tons of copper per month. The blower for the furnaces and converter vessels will be electrically driven; the current will be conducted from the present power-house, where, to meet with the extra demand for power, three turbine generators of 400 kw. each and an additional 1,000-h.p. water-tube boiler are to be installed.

Sulphuric Acid Manufacture.*

BY F. LUETY.

This paper briefly reviews the principal modern improvements in the sulphuric-acid chamber-process, and deals somewhat more in detail with a special method of working due to H. H. Niedenfuehr (German patent, 140,825).

Speaking of the chamber-process generally, the pyrite burners, so far as they are used for treating lump ore, have undergone no change for some decades past. For burning fines, the mechanical roasters of Herreshoff, Humboldt and O'Brien have for the last six years or so found increasing application.

The economy of these depends principally on the saving of labor; where this is cheap, as in some parts of Germany, a modern hand-worked shelf-furnace may still be preferred.

The shape of the material for packing the Glover tower has been found to be of less importance than was formerly supposed. But it is desirable (especially since much of the material supplied consists of fines) to grade the packing, making the interstices 3 to 4 in. wide near the bottom, and gradually reducing them to a little over an inch at the top. The Rohrmann-Niedenfuehr method of dividing the packing into two separate portions (of which only the smaller lower portion requires occasional renewal, while the upper will serve for many years) continues to give satisfaction.

It has been found that the efficiency of the Glover tower is much increased by making it higher and larger, and placing it comparatively high with respect to the roasters, thus securing a good draught for the latter and rendering it possible to regulate the flow of gas behind the Gay-Lussacs, without interfering with the working of the roasters.

The Gay-Lussac is now made of liberal dimensions, two or three towers with an aggregate capacity of 275 cu. m. (97,115 cu. ft.) for 50,000 kg. of chamber acid. The last tower is best filled with coke. The others are advantageously filled with Lunge plates and basins, as this system affords good absorbing qualities, combined with low resistance.

The chambers should be comparatively narrow and high, thus differing from the older type. For small plants, three; for larger plants, four chambers are worked in combination. Circular chambers were proposed by Delplace; and later, in the form of "tangential" chambers, by Meyer.

An improvement which appears to have considerable merit is the Lunge plate-tower. In one instance, careful observations, extending over a period of several months, showed a minimum production of 26.9 kg. of chamber acid per cu. m. of gross tower space; this result was obtained with the tower placed at the end of the system, where the sulphur dioxide is very dilute.

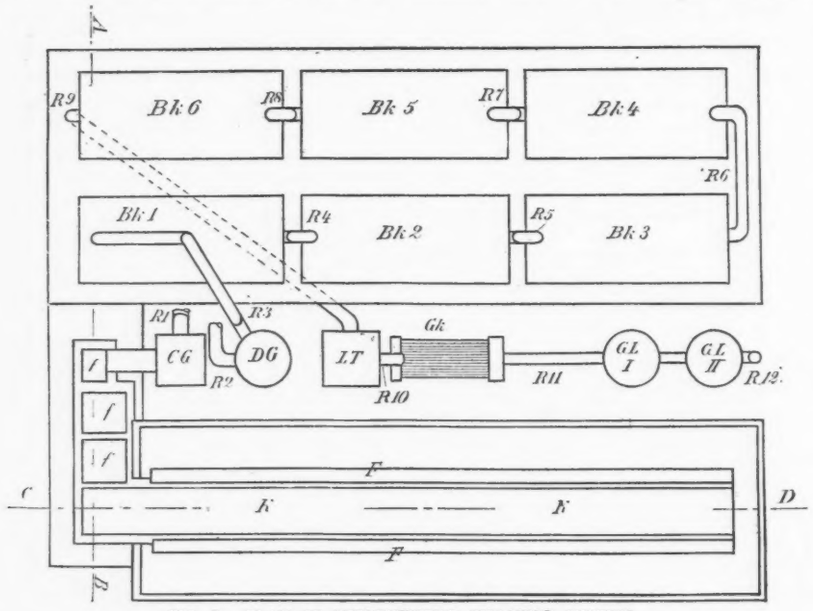

FIG. I. PLAN OF NIEDENFUEHR CHAMBER SYSTEM.

An important means for increasing the productive capacity of the modern chamber system is the fan. The best place for this would be immediately after the roasters, were it not for the increased volume of the gases due to their higher temperature. Where fines are burnt, the fan placed here would also cause increased flue dust, choking of the Glover, and hence higher consumption of niter. Neither must the fan be placed between the Glover and the chambers, as it would here be attacked by the nitrous fumes; for the same reason it has been found impracticable to set it behind the last chamber.

Where a Lunge plate-tower is used at the end of the chamber system, the fan can be placed between that tower and the Gay-Lussac. Otherwise it must be between the first two Gay-Lussac towers; or if only one is used, after that one, though in this case it is utilized to the least advantage.

With the increased activity produced in the chamber by these various means, the necessity for removing the heat of reaction has become more pronounced. The use of atomized water (instead of steam) has proved very beneficial, especially in high chambers. Of course, the water must not impinge directly upon the chamber walls. It is best to use a number of small jets distributed over the ceiling of the chamber.

In the Lunge plate-tower the requisite cooling is effected by the acid trickling down, which should be passed through a refrigerator if the tower is intermediate between two chambers.

With such appliances as those described above, it has been found possible to raise the normal production (from 3 or 4 kg. of 50°-acid per cu. m. of chamber space, which had long been the usual figure) to 6 or 7 kg. Higher production than this has probably not been obtained with normal economic working. Of course, these figures apply only to systems consisting entirely of chambers, and not to combinations comprising Lunge plate-towers and the like.

The process of H. H. Niedenfuehr is devised with a view to overcoming the difficulties attending the use of a fan to produce the requisite draught in the system. The inventor attains his end by dividing the Glover tower into halves, between which the fan is placed. The gases from the roasters first enter a concentrating tower, in which they give up the major part of their heat, and at the same time are freed from most of the accompanying flue dust. In this condition they, on the one hand, no longer exert a destructive action upon the fan; while, on the other, they occupy a smaller volume, thus reducing the work of propelling them. The fan then forces the gases through the second (the de-nitrating part of the Glover tower) through the chambers, and the Gay-Lussacs. The acid from the latter is fed to the de-nitrating half of the Glover. If the acid is to be completely de-nitrated here, it is advisable to introduce a little steam, while adding at the same time chamber acid or water, so as to dilute the acid charged with oxides of nitrogen to about 55° B. However, in practice it has been found that it is quite sufficient to dilute the Gay-Lussac acid down to about 57° B. It then contains about 0.2% of 36° B, HNO_3, and is sent to the concentrating Glover (in which it is again brought up to 60-61° B, and also is freed from the last traces of oxides of nitrogen) to be returned to the Gay-Lussac. The small quantities of nitrous fumes still contained in the gases which

*Abstract of a paper in *Zeitschrift für angewandte Chemie*, Aug. 11, 1905, p. 1253.

come in contact with the fan, do not affect the latter.

In a plant in which 18,000 kg. of 44% pyrite was burnt daily, it was possible (by the proper use of dust chambers, and through the high roaster efficiency per unit-area of grate surface) to keep a temperature of 400-420° C. in the gases entering the first part of the Glover; in this way considerable quantities of chamber acid could be fed to it for concentration, in addition to the Gay-Lussac acid.

The following advantages are gained by the arrangement described above:

In the first place it makes the working of the roasters independent of that of the chambers. It is possible to throttle the latter very considerably without influencing the running of the roasters or the composition of the gases. As the burners have a constant draught, the chambers

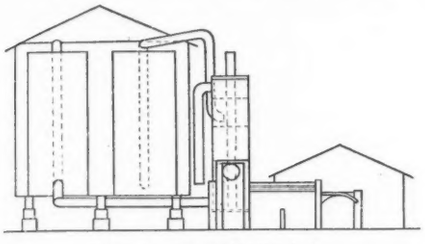

FIG. 2. SECTION ON A-B.

may be worked with more concentrated gases, without harm to the process. If they are kept at about 9% SO_2, the exit gases from the Gay-Lussac still contain 4% oxygen; and, as the composition of the gases is sensibly constant, this excess of oxygen is quite sufficient for the proper working of the process. The roasters can receive much larger charges than hitherto, giving uniform and exceedingly favorable results. With a charge of 40 kg. of 50% pyrite, the cinders contained 0.5% of sulphur. With a charge of 47 kg. this figure rose to a little over 1 per cent.

The composition of the roaster gases, being practically independent of the progress of the reaction in the chambers, is practically uniform, as is also the working of the roasters.

A further advantage of the process is that it permits of the simultaneous use of several roasters charged with different ores. Lastly, the position of the fan between the burners and the chambers tends to prevent leakage from the former and thus to increase the yield.

Moreover, the reaction in the chambers is affected, in that there is a slight excess of pressure, which, in practice, has been found greatly to accelerate the formation of sulphuric acid. The best evidence for the uniform and thorough utilization of the chamber space in Niedenfuehr's process is found in the uniform temperature which has been observed to prevail throughout the whole length of each chamber.

The consumption of niter is very low, owing to the facts that the de-nitration is carried out at a low temperature and with purified gases; that the chamber gases have a uniform composition; and that, in the Gay-Lussac, the conditions are favorable for the absorption of nitrous fumes.

The production per cu. m. of chamber space was found, in three different installations, to be from 9 to 11.5 kg. of chamber acid; it was observed that it increased, proportionately, the higher and narrower the chambers were built. Figures regarding the consumption of nitric acid are available in the case of one plant: 0.6 to 0.7 parts of 36° nitric acid were used per 100 parts of 50° sulphuric acid.

The influence of pressure on the course of the process seems to be such that increased pressure tends to push the reaction forward to the front end of the chamber, so that it is completed in a lesser volume, and more gas can be introduced into the chamber space remaining unutilized, with corresponding increase in the production. However, this must be carried only so far that the process always goes on throughout the whole space; that is to say, so that there may not be a quantity of residual gas, containing nitrous fumes but no sulphur dioxide, advancing for a considerable distance through the chamber; otherwise the oxides of nitrogen seem to be converted into "hyponitric" acid, as is shown by the fact that under these circumstances the Gay-Lussac towers immediately cease to work satisfactorily.

It has been found in practice that the efficiency of the chamber space increases with the height of the chamber. From this, Niedenfuehr concludes that the usual form given to the chambers (a long channel through which the gases take a practically horizontal course) is not the best; that they should rather resemble towers, the shape of the cross-section being somewhat immaterial, and that the gases should be forced down through them by the fan, their natural tendency being to rise by virtue of their high temperature. In this way a thorough mingling of the gases is secured.

It is important to note that the new process not only furnishes a means for rendering existing installations more effective and at a very small cost, but further, it provides a remedy for plants suffering from faulty construction. Many works have their Glover tower too small or placed too low, leading invariably to a low production and high niter consumption, poorly roasted ore and loss of gas. These evils are readily removed by applying the method of Niedenfuehr's patent.

To obtain an estimate of the economic value of this process, let us consider a Niedenfuehr chamber-system with a daily production of 50,000 kg. of chamber acid (figured as monohydrate, equivalent, therefore, to about 80,000 kg. of 50° acid). The accompanying drawings show such an installation in plan and in two vertical sections, along the lines *A B* and *C D* of the plan.

The fines burner *F* consists of 44 compartments, each of 20 sq. m. (215 sq. ft.) grate area, and with seven shelves.

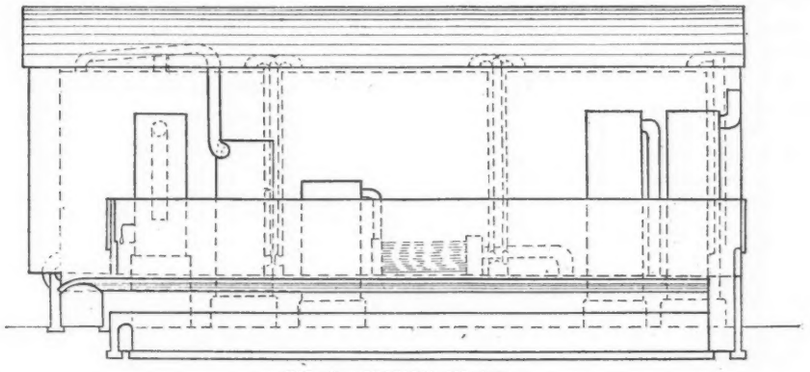

FIG. 3. SECTION ON C-D.

It is placed at such a depth below the ground level that the pyrite can be charged in almost horizontally from the railway car. From the lowest shelf of the burners, the cinders drop directly into wagons running on a track to an elevator, by which they are emptied into a bin, placed at such a height that the cinders can be dumped from it straight into railway cars.

The roaster gases of the burners *F* collect in the flue *K*, pass through the dust chamber *f f f* and on to the concentrating Glover *C G*. From here they are led (by the pipe R_1) to the fan, which is placed underneath the chambers. With the Niedenfuehr process, considerably narrower pipes can be used than heretofore. Thus *R*, will be sufficiently large with 70 cm. (27½ in.) diameter. The fan forces the gases through R_2 (70 cm.) into the de-nitrating Glover *D G*, which they leave by the pipe R_3, of the same diameter, communicating with the first chamber $B K_1$ by two openings, of about 60 cm. (23¼ in.) diameter, in the top. The gases pass out from this chamber by the exit pipe R_4 about 1 m. above the bottom, and enter the second chamber $B K_2$ at the top. In the same way the remaining chambers are connected by pipes R_5, R_6,

R_7, R_8 (65 cm., 25½ in. in diameter). The gases pass off from the bottom of BK_6 by the pipe R_9, and enter the Lunge tower LT above. This has a cross section 4 by 4 m.; it is 8.5 m high (13 ft. 1 in. by 13 ft. 1 in. by 27 ft. 10 in.). The chambers are 6 m. (19 ft. 8 in.) in breadth; 14.2 m. (46 ft. 7 in.) long, and 14 m. (45 ft. 10 in.) high. The exit gases, dried in LT, pass through R_{10}, into the cooler GK, and thence, by R_{11}, to the Gay Lussacs I and II, finally finding their way to the exterior by the throttle valve in pipe R_{12}. The pipes R_9 and R_{10} are 67.5 cm. (26¼ in.) in diameter; the other pipe connections, up to R_{12}, are 65 cm. Basing our estimate on the same figures as those used by Lüty and Niedenfuehr in their "Comparative Study of the Returns from Sulphuric Acid Manufacture by the Contact Process and by the Modern Chamber Process" (*Zeitschr. f. angew. Chem.*, 1902, No. 2), we have the cost of installation of the system represented in our drawings, as given herewith.

1. About 1,800 sq. m. (19,400 sq. ft.) land, 36,000 marks ($9,000).

2. Buildings, about 78,000 M. ($19,000).

3. Machinery, etc., 17,500 M. ($4,375).

4. Roasters, dust chambers, elevator, rails and bin, 72,000 M. ($18,125).

5. Chambers and towers, 116,000 M. ($29,000).

Total cost of installation, 320,000 M. ($80,000).

Reckoning amortization on the apparatus and buildings at 7½%, and interest on invested capital at 5%, gives annually 37,300 M. ($9,325), with a daily production of 50,000 kg. of monohydrate; or for 100 kg., 20.72 pfennigs (5.13 cents).

We have further:

Per 100 kg. H_2SO_4.	Marks.	Dollars.
Cost of Pyrites	1.28	0.3200
Nitric acid	0.21	0.0525
Power (for atomized water and pyrite burners	0.0307	0.0077
Wages (3 marks a day per man)	0.144	0.0360
Repairs	0.0667	0.0167
Amortization and interest	0.2072	0.0518
Total	1.9386	0.4847

We have then the cost of production of 100 kg. H_2SO_4 (exclusive of general expenses) 1.94 M. (48.47c.), a reduction of almost 17%, as compared with the figure of the estimate given in 1902 in the paper quoted. Substituting this value in the estimate (as given in 1902 for the cost of production of acid concentrated in Kessler pans), we have for 100 kg. of 66° acid (93% H_2SO_4), a first cost of 2.19 M. (54.75 cents).

Zinc unites with silver at high temperatures, forming a series of white alloys. Those with 5, 10 and 20% zinc are ductile and can be rolled like silver. They are more fusible than the corresponding copper-silver alloys.

The Transvaal Commission on Safety in Hoisting.

In several previous issues of this JOURNAL, reference has been made to the Commission which has been appointed by the Transvaal Government to report and make recommendations with regard to the practice of conveying persons in mine shafts. The Commission invites the coperation of all who can give assistance in this investigation. Any intending witness is requested to communicate with the secretary of the Commission, Room 74, Winchester House, Johannesburg, South Africa. Persons who are unable to attend personally to give evidence are requested to furnish statements, supported by affidavit. The points which are brought to the notice of persons intending to give evidence, or furnish statements, are so pertinent to the entire subject of hoisting in mines, that we reproduce them fully in the following paragraphs. These may suggest ideas to our readers, upon which they will be interested in expressing opinions, which may or may not be suitable as evidence before the Commission. Our columns are open to the discussion of any points that may be raised in that way.

1. *Winding Ropes (Structure).*—(*a*) For what conditions of winding are the following the most suitable? 1. Ordinary lay. 2. Lang's lay. 3. Other special lays.

(*b*) What are the advantages or disadvantages of lays of various angles? 1. In the rope. 2. In the strand.

(*c*) What special advantages or disadvantages pertain to lock-coil ropes, flattened strand ropes, cables, flat ropes, many stranded ropes?

(*d*) For what conditions of winding are the following strand constructions the most suitable?

6 round	1	. .		Wires all the same size.
7 "	5 round	1	)	Wires differing in size, outside circle composed of larger wires, and often of a little higher grade material.
8 "	3 "	1		
8 "	5 "	1		
8 "	6 "	1		
8 "	7 "	1	)	
9 "	6 "	1	)	All wires practically the same size, tending to have outside wires slightly larger, say .003 in difference.
10 "	5 "	1		
11 "	6 "	1		
12 "	6 "	1	)	
8 "	a flat wire core of same grade as outside wires.			
9 "	3 twisted in opposite direction to outside wire.			
9 "	12 round a triangular core,			
etc.	etc.		etc.	

(*e*) *re* Core of Strand.—What are the advantages or disadvantages of hemp, hard wire, soft wire, flattened wire, triangular wire, core of other shape or material? What proportion of the strength of the strand can be assigned to it?

(*f*) The advantages or disadvantages of a strand composed of large wires outer?

(*g*) Should the various lengths of wire in a rope be connected, and if so, the most approved method of joining, such as brazing, etc.?

(*h*) The best method of construction of a tapering rope, with special reference to the difficulties in its manufacture.

(*i*) The most suitable material for the main core of a winding rope and its most suitable form. What proportion of the strength of a rope can be assigned to it?

(*j*) Other particulars of interest with reference to this subject.

Winding Rope (Material).—(*a*) For what conditions of winding are the various grades of steel ordinarily used in the construction of ropes specially suitable?

(*b*) To what extent is ductility sacrificed in the gain of tensile strength?

(*c*) What are the tensile strengths and ductility of the steels (untempered) of which wire ropes are drawn? 1. How do these increase or decrease during the drawing process? 2. What are limits of tensile strength and ductility of wires of the various standard sizes?

(*d*) What special alloys (*e. g.*, nickel steel) have been experimented on for the manufacture of wire ropes, and with what results?

(*e*) How does any special treatment (*e. g.*, galvanizing) affect the strength and ductility of the wires of a rope?

(*f*) Any other particulars of interest with reference to this subject?

2. *Winding Rope (Preservation).*—(*a*) To what extent this may be influenced by preservative treatment during manufacture.

(*b*) The composition of various preservative and lubricating dressings for ropes working in: 1. Dry shafts. 2. Wet shafts—acid, alkaline or neutral waters.

(*c*) The efficiency of various dressings in respect of corrosion and wear.

(*d*) The frequency of application of dressing under the various conditions.

(*e*) The method of application of dressing.

(*f*) To what extent the dressing obscures the condition of the rope in the customary frequent examinations.

(*g*) The efficiency of any metallic covering, such as galvanizing.

(*h*) To what extent the life of a rope is affected by working conditions such as: 1. Description of winding plant. 2. Variation in direction of shaft. 3. Use of rests in loading. 4. Speed of winding. 5. Description of guide pulleys, etc., etc.

(*i*) To what extent the life of a rope is increased by periodical recapping.

(*j*) Any other particulars of interest with reference to this subject.

Winding Rope (Examination).—(*a*) Nature of examination. (*b*) Frequency of examination. (*c*) Appliances for assisting examination. (*d*) The portion or portions of a rope that should be most carefully examined. (*e*) The necessity or otherwise of relieving the rope from strain during the examination. (*f*) The best method of examining a rope internally. (*g*) The best method of assessing deterioration. (*h*) Any other particulars of interest with reference to this subject.

2. *Winding Rope (Best Method of Testing).*

(*a*) How can the true strength of a new rope be best ascertained?

(*b*) How far does the true strength of a rope differ from the nominal strength (breaking load) as quoted by the manufacturer?

(*c*) The various methods adopted by manufacturers to assess the ultimate strength of a new rope.

(*d*) What considerations affect the choice of a factor of safety?

(*e*) In the tension test of a sample of the whole rope, what length of test piece would be considered to give a true indication of the strength of the rope?

(*f*) How should the specimen be gripped during the test?

(*g*) What other tests beside tension tests are of value in determining the quality of a new rope?

(*h*) Regarding the utility of a periodical test, during the working life of a rope, of its elongation under known loads. (Should the loading be in excess of normal conditions, and if so, to what extent?)

(*i*) In what manner, and how frequently, should such elongation tests be made?

(*j*) What indications in respect of deterioration of strength could such tests furnish?

(*k*) What length of rope is it advisable should be cut off at the time of recapping, and what tests—mechanical, chemical, etc.—should be applied to such portion?

(*l*) During the working life of the rope what tests can be applied—mechanical, chemical, electrical, microscopic, etc.—to show the deterioration in quality of the material of which it is composed?

(*m*) Is the reduction in cross-section, as ascertained from circumferential measurements of various parts of a loaded rope, a reliable indication of its loss of strength?

(*n*) Is the visible wear on the external wires a useful indication, in itself, of the loss of strength in a rope?

(*o*) Can the internal wear be assessed separately from that visible externally?

(*p*) Any other particulars of interest with reference to this subject.

4. *The Best Method of Attaching the Rope to the Load.*—(*a*) Regarding the various methods of securing a rope to a thimble, or in a socket—their efficiencies, advantages or disadvantages—the various constructions of rope also being taken in consideration.

(*b*) The various methods of connecting up a load to the eye of the thimble, or socket. (Should swivels be used?)

(*c*) The advantages or disadvantages of spring connections, or other special connections designed to minimize shocks.

(*d*) Of supplementary safety chains.

(*e*) The frequency with which connecting appliances should be annealed, and the methods adopted for this purpose. Have variations in temperature (climatic) any deleterious effect?

(*f*) The practice of connecting up a man-cage, as necessary, below a skip or other cage.

(*g*) The material of which connecting appliances should be constructed, and the proper factor of safety to be adopted.

(*h*) Any other particulars of interest with reference to this subject.

The Reliability and Adaptability of Safety Catches and Appliances in Shafts.—(*a*) Regarding the utility and reliability of the various methods of providing against excessive speed in winding.

(*b*) Of the various methods of preventing an overwind of the load in either the up or down trips.

(*c*) Of the various methods of disconnecting the rope from the load in the case of an overwind in the head gear, and the means adopted to support the load after disconnection has occurred.

(*d*) Of safety appliances designed to stop, check, or suitably govern the motion of the load in case of the rope breaking on either the up or down trip.

(*e*) Concerning any other safety appliances in use for winding—*e. g.*, safety crosshead guide for sinking buckets, etc.

(*f*) To what extent do any of the safety appliances above referred to constitute an additional danger to winding operations?

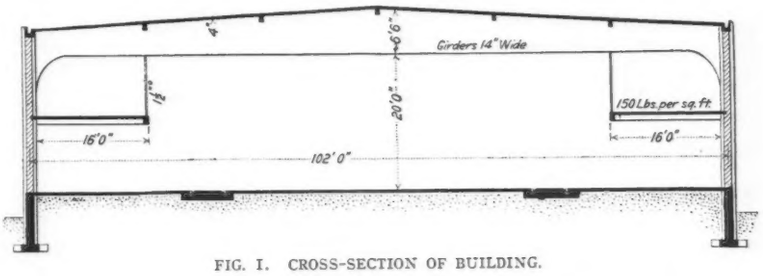

FIG. 1. CROSS-SECTION OF BUILDING.

(*g*) Particulars (authenticated) are desired concerning accidents that have occurred during winding operations, with special reference to the reliability or otherwise of safety appliances.

(*h*) Any other particulars of interest with reference to this subject.

In order to assist the inquiry into the reliability and adaptability of safety appliances for use in connection with the raising and lowering of persons in mine shafts, inventors and manufacturers of such safety appliances are invited to forward to the secretary drawings and plans of their schemes, together with full descriptions of their working. All drawings should be on tracing cloth and suitable for sun-print reproduction, of scale 1 inch to the foot for general views, and 3 inches to the foot for special details. Models may also be forwarded, but these are not obligatory. Drawings and models will not be returned, but will remain the property of the Transvaal Government.

Practical tests under normal working conditions will be made of appliances selected, and for this purpose it will be necessary for each inventor or manufacturer when submitting drawings to also furnish written permission empowering the Commission, if they so desire, to construct or cause to be constructed the appliance in question for purpose of the test. The modifications, if such be necessary, or if such be possible, to enable safety catches or grips to be used in shafts fitted with either wooden or steel guides should be specified.

All communications, statements, drawings and models must be dispatched so as to reach the secretary not later than Jan. 31, 1906.

Concrete Steel Roof of Long Span.

A reinforced concrete roof with a clear span of more than 100 ft. has been described in *Engineering News* (April 20, 1905), from which we take the illustration. L. J. Mensch, the engineer who designed the structure, furnishes the following description:

The building covers an area of 104x150 ft., and was intended to be built of 17-in. brick walls with 25-in. piers, spaced 16 ft. 6 in. on centers and covered by a steel truss and corrugated iron roof of 100 ft. span.

The owner desired, however, to build an arched reinforced-concrete roof instead of the steel construction. Considering that the roof had to carry a suspended gallery and that means had to be provided for lifting heavy weights and eventually to suspend tracks for light traveling cranes, the idea of an arched roof was discarded and straight girders of 102 ft. span adopted.

Fig. 1 shows a cross-section of the warehouse as it was built. The girders are 16 ft. 6 in. apart, 6 ft. 6 in. deep at the center and have a slope of 3 ft. toward each end. They are 14 in. wide and reinforced at the bottom by ten 1½-in. steel rods of medium steel, two of which are straight, the others bent into a hog chain form, all secured to the concrete by 1-in. by No. 14 stirrups from 8 to 24 in. apart. The top is reinforced by three 1½-in. rods, 66 ft. long. Heavy brackets connect these girders with 24x24-in. concrete piers, reinforced by five 1⅜-in. rods at the outside and two ¾-in. rods at the inside. This gave a skeleton construction and allowed of a reduction in the thickness of the walls to 12 inches.

Hollow concrete block walls were adopted, and were carried by 14-in. concrete foundation walls 8 ft. deep. These walls were enlarged at each pier, and reinforced

by ten ⅜-in. rods placed horizontally near the top.

The ground consisted of loose sand, and as serious settlements were found in nearby buildings, only one ton per square foot was assumed as the resistance of the ground. Therefore the footings for the walls were made 3 ft. wide and those for the piers 7 ft. square, all 12 in. deep and reinforced by ⅜-in. steel rods.

The saving in the walls and footings more than counterbalanced the slight increase of cost of the concrete girders over the steel trusses. The girders were connected by 6x11-in. beams reinforced by four ⅞-in. rods and covered by 4-in. roof slabs reinforced by ⅜-in. rods 5 in. on centers in both directions. An ordinary composition roofing was used.

There are six sheet-metal and wire-glass skylights in the building, each 6x16 ft. Two galleries 16 ft. wide and 120 ft. long are suspended from the roof girders by 1½-in. rods. These galleries consist of 8x12-in. beams 16 ft. 6 in. on centers, and a 5-in. floor slab. They are figured for a load of 150 lb. per square foot.

The erection proceeded very rapidly, and it was built in a shorter time than the delivery of steel trusses could be effected. It took about two weeks to erect the centering and one week for the concreting.

The concrete was mixed in the proportion of one part Iola or Colorado cement to 1½ parts of sand and 3 parts of crushed granite in the lower portion of the girders, and 1:2:4 for all other parts.

These girders of 102 ft. span are the largest ever attempted, and it is believed that there does not exist another fireproof roof of such a great span. The building cost complete $15,000; the roof construction alone, about $9,000. Cement cost $2.40 per bbl., crushed stone $2.50 per cu. yd., and sand 60c. per cubic yard.

A zinc alloy which is easily worked, and stands rough usage better than white metals made with lead as a base, may be made by mixing 88 lb. of zinc, 10 lb. of copper, and 2 lb. of aluminum. By using 12 lb. of copper and no aluminum the alloy will be made harder. According to *Iron Trade Review* (Aug. 24, 1905), the process of melting is as follows: The copper is first melted and enough cold zinc is added to "kill it" or to prevent it spitting when added to the bulk of the zinc. The zinc is melted separately, the copper poured into it, and the mixture is stirred. The aluminum is added after the copper and zinc have become perfectly fluid, and the mixture is then once more stirred. It is then cast into inch plates, which are cooled, broken up and remelted under small charcoal. The alloy should be poured into horizontal sand-covered molds. The surface of this alloy resembles oxidized silver, and may be filed and polished. It cuts under a file similar to gray iron.

Iron Resources of the World.*

BY R. ANSPACH.

Prof. A. E. Törnebohm, president of the "Sveriges Geologiska Undersökning," has made an exhaustive report to the Swedish Parliament, from which is taken the information embodied in this paper.

In inquiring into the extent of the world's iron resources, we must remember that, in the very nature of such an investigation, it cannot be solved with any great degree of accuracy, not even when only one country is considered, and still less for a whole continent or the entire globe. For, on the one hand, the location of ore deposits is known with tolerable accuracy only in more or less civilized regions, while, on the other hand, it is in many cases unknown how rich the various deposits may be at greater depths. In addition to this, there is much uncertainty as to what character of ore may properly be taken into account in estimating ore supplies. For, besides the unquestionably good ores, there are large quantities which are of less value, either owing to their composition, or to their low iron content, or from both causes. But there is a continual endeavor to find the means for exploiting these ores of lower value, and the marvelous development of the iron industry within the last twenty or thirty years has been largely the consequence of progress made in this direction.

To quote only a few familiar instances, the reader will recall how the Thomas method for working up phosphorus-bearing ores called to life the Norbotten fields, and the still far more extensive industry based on the minette (oolite) ores of Lorraine; he will further remember how the success recently achieved in the magnetic concentration of ores has laid the foundation of a gigantic undertaking for exploiting the low-grade, but otherwise highly important, Dunderland ores in Norway. All these ores were, before these improvements, regarded as almost unworkable; and so the question naturally arises whether other ores, which at the present day are considered practically worthless on other grounds, may not perhaps some day acquire importance through further technical progress. Regarding ores belonging to this last class, data of any value are so meager, so far as foreign deposits are concerned, that it will be necessary to leave them out of account altogether in these considerations.

On the Swedish iron-ore fields Prof. Törnebohm has collected the following material, for which absolute accuracy can not be claimed, as was pointed out above, and which is based in part on rough estimates.

Norbotten.—According to the latest investigations, the ore supply in this district may be estimated as follows:

Kirunavara: Ore above the level of Luossa jarvis	265,000,000 tons
Ore beneath the same, down to a depth of 300 m	510,000,000 "
Luossavara	18,000,000 "
Total	793,000,000 tons

The ore is exceedingly rich; it contains 65 to 70% iron throughout, and the phosphorus runs high—1 to 2% as a rule. Most of the ore (80%) is exported to Germany. In England there has as yet been little demand for the ore, as only a few iron works have taken up the basic method (Thomas method), by which it has become possible to produce good iron from phosphorus-bearing ores. But, according to recent information, this method is finding more and more application in England also.

Gellivare.—The ore supply in Gellivare, above the railway line, is estimated at 53,800,000 tons, and down to a level 100 m. below this line at 49,700,000 tons, altogether therefore at 103,500,000 tons. But as ore is undoubtedly still found at greater depths than that indicated (at any rate, in the more important mines), we may, without danger of overestimate, add a quantity of at least one-half of that lying within 100 m. beneath the level of the railway line—that is to say, in round numbers 25,000,000 tons; so that the total ore supply in Gellivare may be estimated at 128,500,000 tons. The iron content of the ore is 55 to 65%; the phosphorus varies widely, but is considerable throughout.

The most important of the remaining Norbotten ironfields are: Ekströmsberg, Mertainen, Svapavara, Tuolluvara and Leväniemi. The quantity of ore in Ekströmsberg is estimated at about 100,000,000 tons, that in Mertainen and Laukujärvi at about 5,000,000 tons. The percentage of iron in these two fields is 55 to 65; the phosphorus is rather high in Ekströmsberg, low in Mertainen. There are no estimates available of the other three fields, but they can be roughly gauged according to the known area of the ore deposits. This area is:

Svapavara,	50,000 sq. m.	12.355 acres
Tuolluvara,	10,000 "	2.471 "
Leväniemi,	40,000 "	9.884 "
Total	100,000 "	24.710 "

Supposing these fields to be worked to a depth of 200 m., and reckoning 3.5 tons of ore to the cubic meter, gives 70,000,000 tons as the total quantity of ore. The percentage of iron in this field is 60 to 70; the phosphorus is comparatively low in Tuolluvara, while in the other districts it varies a great deal, though it is high throughout. The stock of ore in the chief iron fields of Norbotten is, therefore:

Kiruna—Luossavara	793,000,000 tons
Gellivare	128,500,000 "
Ekströmsberg	100,000,000 "
Mertainen Laukujärvi	5,000,000 "
Other mines	70,000,000 "
Total	1096,500,000 "

Central Sweden.—The ore supply of Grangesberg, down to 300 m. below the surface, is estimated at 60,000,000 tons.

*Translated from the *Zeitschrift für angewandte Chemie*, 1905, p. 1179.

The ore supply in the numerous other iron mines of central Sweden can at the present time be estimated only roughly, according to the area of the fields. This may be taken to be about 200,000 sq. m. (49.42 acres). As the more important mines are already much attacked, we may assume that they cannot on an average be worked further down than for another 100 m. Asuming that each cu. m. yields 2.25 tons of ore, the total quantity of ore would be 45,000,000 tons. On this basis the total ore supply for central Sweden is, therefore, 105,000,000 tons, and for the whole realm, in round numbers, 1,200,000,000 tons.

Two important ore deposits—Routivare in Norbotten and Taberg in Smaland—have not been taken into account above, as their ore is highly titaniferous, and therefore does not reach the market. For Routivare the area of deposit is given as 300,000 sq. m. (74.13 acres). This, however, rather represents a collection of nodules of ore than a continuous deposit, and it is, therefore, uncertain whether the depth corresponds at all to the area of the district. It is at present impossible to estimate the quantity of ore.

Taberg has an area of about 260,000 sq. m. (64.25 acres). The orebody is more collected here, and probably has a considerable depth, but the iron content is low (in the richest parts 30 to 40%); this, together with the high percentage of titanium (5 to 6%), has hitherto prevented the exploitation of the ore.

Foreign Iron Deposits. Norway.—In recent years several important deposits of iron ore have been discovered in the northern part of Norway. The most important are the Dunderland, the Naeverhaugen and the Sydvaranger districts. So far as the area of the deposits is concerned, these much surpass the Norbotten fields, but the ores are on the whole poor (30 to 40%). Large installations for exploiting the Dunderland ores are in the course of erection. The ores that can be reached by surface working alone are estimated at 80,000,000 tons. It is proposed to concentrate magnetically to 62 to 64%, to briquette the ore, and to export annually to England 750,000 tons, there being a good demand for it there, owing to its low phosphorus content. In Naeverhaugen and Sydvaranger, no estimates of any account have as yet been made of the ore deposits. Statements regarding the quantity of ore differ a good deal; the iron content varies between 30 and 58%, but is said to be 38% on an average.

Outside of Scandinavia the countries which at present chiefly produce iron ore in quantities affecting the world's market are England, Lorraine, Spain, southern Russia, and North America

England.—The older English iron fields are now mostly exhausted, and therefore abandoned. Most of the fields at present under operation have been opened up within the last ten years, as the Cleveland, West Cumberland, Lincolnshire, Northampton, Derbyshire, Notts, Leicester and Oxfordshire fields. The most important of these are the Cleveland fields, in which, however, the iron runs low (about 30%), and moreover appears to be going down still further. In the year 1850, when the Cleveland field was first opened, the ore supply was estimated at from 4,000,000,000 to 5,000,000,000 tons. Since then about 250,000,000 tons of the best ore has been extracted, and what still remains of such ore will be exhausted in about twenty years' time. The ore that will then be left is in general of such poor quality that, with the present machinery and methods, it would not be considered worth mining. The condition in the other English iron ore districts is much the same as in the Cleveland fields. The iron ore production of Great Britain is decreasing. It reached its maximum in 1882, with 18,000,000 tons; it is now about 12,500,000 tons, of which Cleveland contributes 40.2%; Lincolnshire and Northamptonshire, 26.7%; Cumberand, 11.7%; Scotland, 6.2%, and Staffordshire, 6.1%. The annual consumption of ore in England is at the present time 20,000,000 tons. The deficit (some 6,500,000 tons) is covered by importation, chiefly of Spanish ore.

Lorraine and Luxemburg.—The minette (oolite) ores which occur here are of the greatest importance. They contain 35 to 40% iron and 0.7 to 0.8% phosphorus. The ore supply is thus estimated:

German Lorraine	1,835,000,000 tons
French Lorraine	1,300,000,000 "
Luxemburg	300,000,000 "
Total	3,435,000,000 "

The minette ores at present furnish 80% of the total production of Germany, and 66% of that of France.

Spain.—The principal iron district of Spain is the Bilbao field, on the north coast. The iron content of the ore there runs from 50 to 55%; the phosphorus is insignificant. The original stock, once so extensive, is now greatly broken into, and the production is decreasing. In the year 1899 it amounted to 6,500,000 tons, in 1902 to 4,700,000 tons. This supply will presumably be exhausted in ten or twenty years. The ore is exported chiefly to England, which of late years has received about 3,000,000 tons annually. In several places new fields have recently been discovered in Spain, and mining has been begun on some of these, as for instance in Castile, in Asturia (where are several deposits with an aggregate stock estimated at about 200,000,000 tons); in Sevilla Granda canal, 20,000,000 to 30,000,000 tons; in Paderoso, 10,000,000 tons; in Tornol, 50,000,000 tons; in Huelva (Cala), 18,000,000 tons; also several deposits near the Mediterranean sea, making a total stock of between 50,000,000 and 60,000,000 tons.

Southern Russia.—There are here several important ironfields, the two most important being Krivoi-Rog and Kertsch. In the former the iron content is 50 to 65%, the phosphorus as a rule less than 0.1%. According to the most recent statements, the stock of ore there is taken as 87,000,000 tons (older calculations gave much lower figures), which should be exhausted in some thirty years' time. The production amounted to about 2,500,000 tons in 1903, of which the greater part was exported. The percentage of iron in the ore of the Kertsch peninsula is 30 to 40, higher only in exceptional cases; the phosphorus runs from 1 to 2%. The stock is figured at 846,000,000 tons, of which, however, only perhaps 13,000,000 tons have an iron content of 37% or more.

North America.—The principal iron district in North America lies south and west of Lake Superior, in the United States. On the Canadian side of the lake there are also a few ironfields, but these are of comparatively small importance. There are other iron fields in Alabama, Virginia and Tennessee. The total production of iron ore in the United States in 1902 was 36,000,000 tons, of which the Lake Superior field contributed 28,000,000, Alabama 3,500,000, and Virginia and Tennessee 1,800,000 tons. The Lake Superior ores are in part rich, with 55 to 60% iron, and 0.04% phosphorus. The stock of such ores has been quoted at 1,000,000,000 tons; but this, according to more recent estimates, is too high. It is believed that this supply will be exhausted before the middle of the present century.

Until the year 1900 these mines produced exclusively ore with a minimum of 60% of iron. Since then the practice of mixing the rich ore with poorer material has become more and more widely established, so that the ore now produced does not contain more than 52 to 54% of iron. The oldest of the Lake Superior fields was opened in 1854, the youngest (the Mesabi) in 1892. The latter is now the most productive (13,000,000 tons in 1903). Until 1903, inclusive, 253,000,000 tons had been mined. The ores must be shipped to the blast-furnaces over very long distances (1,000 to 2,000 km. = 620 to 1,240 miles), mostly, however, by water. The ores in Alabama contain 45 to 48% iron, with a rather high percentage of phosphorus. There are coal measures near by. The known range may be estimated at a low figure to hold from 50,000,000 to 60,000,000 tons, but probably the deposits extend considerably beyond the field hitherto examined.

In addition to the ore deposits considered above, there are still a large number of others, on which little or no mining has hitherto been done. As the foremost among these should be mentioned the iron-ore range in the province of Shansi in northern China. In this district coal measures extend over at least 35,000 km., with which iron ores are associated over a large part of the region. For 2,500

years past the main portion of China's iron consumption has been supplied from these ores, but nevertheless the stock is only slightly attacked, and a very extensive supply is still left over.

New orefields have also been discovered in Ireland (county of Antrim, calculated quantity of ore 6,000,000 tons; iron content, 30 to 50%), in the Cyclades, Algiers, the Soudan, Cameroon, India, Tongking, Cuba, Peru, Mexico, New Mexico, Utah, Oklahoma, Canada, New Caledonia, Western Australia, etc. Regarding these deposits, however, no reliable information is at present forthcoming.

The following table, showing the yield in 1901 of the iron-ore districts of different countries, gives an idea of their relative importance for the world's production:

	Tons.
United States	29,730,000
Germany (including Luxemburg)	16,840,000
England	12,470,000
Spain	8,030,000
Russia	5,990,000
France	4,870,000
Sweden	2,840,000
Austria	1,920,000
Hungary	1,660,000
Newfoundland	750,000
Greece	530,000
Algiers	520,000
Belgium	260,000
Italy (Elba)	240,000
Bosnia	130 000
Other countries	620,000
Total	88,490,000

The probable development of the iron-ore situation in the future can be summed up in the following paragraphs:

1. It can be foreseen with certainty that the iron-orefields of North America, Germany and England will be exhausted within one or two centuries from now, those bearing comparatively rich ore much earlier, even.

2. A decline, or the entire dying out, of the iron industry in consequence would take place only in England, as in that country the coal will be used up about the same time. (It has been calculated that the coalfields in Durham and Northumberland will run out in about 100 years, the other English coalfields in from 250 to 300 years.)

3. In Germany and North America the deficit in the home production of iron ore will be covered by importation, in accordance with the well-known rule that the ores travel to the coalfields, and not *vice versa*.

4. Apart from the countries in which industries are flourishing at the present time, only northern China has the requisite conditions for the development of an extensive iron industry, as only there are coal and iron found associated together. Should it, however, at some future time become possible, through technical advances, to recover iron from the ore with consumption of little or no coal, a revolution in the state of affairs would take place, the consequences of which can hardly be appreciated now.

5. The iron production in the coming century will in the main depend (*a*) On ores occurring in countries opened up to industry at the present day, but having hitherto received no attention, either on account of their low grade, or owing to their being otherwise unsuitable; (*b*) on the development of new mining districts in lands as yet little touched by geological exploration.

6. The location of the future centers of iron production will be determined by the position of the coalfields, and by the conditions of transport. These two factors, together with the metallurgical progress in dressing the ores, will decide the course of the iron production in the future. The supply of ores to cover the world's iron consumption will presumably never be exhausted.

The Price of Diamonds.

The retail prices of the higher grades of pure white and blue diamonds from the South African mines were again advanced 5% in London on Sept. 26. There is a good demand for choice blue stones, and some of the best white and blue stones are selling at $500 per carat. Prices were advanced 5% on four occasions last year, and two similar advances have been made this year.

Altogether there have been advances in the rough goods aggregating about 55% in four years, but some grades of stones have been put up even higher. In addition the cost of stones to the cutter has been increased by requiring him to accept in each shipment certain amounts of inferior or yellow stones and large stones which do not cut to advantage.

The average value of the rough diamonds imported at New York last year was $37.50 a carat. The price to the public is much higher because the cost of labor in cleaving, cutting and polishing must be added. The explanation of the advance given by the London diamond merchants is that there is a scarcity of the qualities of stones that are most in demand and mining expenses are greater than formerly.

This is not a fact, however. For several years there has been a steady fall in the cost of production, and the last report of the Premier (Transvaal) Diamond Mining Co., Ltd., stated that "the most promising feature in the outlook is the large size and fine quality of the stones now obtained. Last year a certain parcel weighing 385 carats, when cut yielded brilliants weighing 191 carats, and three other stones weighing 689 carats were valued at £14,066, or over £20 per carat." The actual cost of production in the Premier (Transvaal) mine in 1904 was 62c. per load of 16 cubic feet.

A better explanation of the continual advances in prices appears to be that the De Beers and Premier companies are working in harmony. Neither can afford to war against the other; and there is every likelihood of them continuing to work together in controlling the market and advancing prices on every favorable opportunity. Each company has enormous diamond reserves. The "pipe" in the Premier mine, in the Transvaal, has been proved by drilling to continue to a depth of 1,000 ft. Between the present working level and a depth of 400 ft., it is estimated there are fully 105,000,000 loads of diamondiferous earth worth at least one carat per load, which can be mined at about 75c. per load. The present annual diamond yield is between 400,000 and 600,000 carats, valued at about $3,000,000 to $5,000,000. The returns from the four De Beers mines are valued at about $25,000,000 yearly. The combined output of the diamond fields of Australia, Brazil, and British Guiana are insignificant in comparison with the South African yield.

Cost of Electric Power.

"Many electrical engineers have published minute data as to the cost of power generation, but only for electric lighting, traction and motor purposes. These cases are so different that no definite conclusions can be drawn from this evidence," says R. S. Hutton in the *Journal* of the Society of Chemical Industry, of June 15, 1905. "The average power station is fortunate to get a 15% load-factor and overjoyed with 30%; whereas in nearly all electro-chemical works the manufacture is continued night and day, and the load-factor may be taken as 100 per cent.

"If one may judge from the evidence of those few who have had actual experience in electro-chemical industries using steam power, a figure of $30 to $40 for the horse-power-year is quite attainable under such conditions. With producer gas, this may already be brought down to $20 in Great Britain.

"For the sake of comparison, it may be pointed out that although in some few places in the Alps and Norway a figure as low as $4.25 per horsepower-year has been attained, water power is very seldom to be obtained so cheaply. At Niagara the price of supply to large consumers varies from $17.50 to $20.75, and at Rheinfelden reaches $30 for the horsepower-year.

"So far as blast-furnace gas is concerned, no very sure data are available for similar industries. With cheap gas power, the number of remunerative electro-chemical industries may be very largely increased in Great Britain."

Copper brushes for commutator use are sometimes made of fine gauze, folded or rolled and pressed into shape; these make a contact that is not excelled by any other form of brush; they may be set radially so as to do away with the necessity of trimming. They are almost ideal for heavy currents at low voltages, but the price is so high that they are rarely used.

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THE DECISION OF the Government of Ontario to revise the mining laws of that Province will excite much interest, not only among those who are directly concerned, but also among those who look upon the matter as one of scientific development. General laws are apt to become saddled upon a country, and although galling features may be ameliorated, it is not often that a complete change can be made. The difficulty of discarding a bad mining law is well appreciated by mining men in the United States.

The Sulphur Trade.

The disruption in the sulphur trade of the world, which has been threatened by the advent of the Louisiana sulphur, has been averted by an agreement between the producers. The world's market for this mineral was formerly supplied chiefly by the mines of Sicily, which are controlled by the Anglo-Sicilian Sulphur Company. A large and profitable portion of its trade has been the supply of the American demand. In 1902, the exports from Sicily were 467,000 long tons, of which the United States took 169,000 tons, the domestic production in that year being comparatively insignificant. In 1903, the production of sulphur in Louisiana, from the great deposits which attempts had been made to exploit for 15 years previous, finally materialized through the success of the ingenious Frasch process, the output in that year amounting to 35,000 tons. In 1904, the production of sulphur in the United States jumped to 191,000 tons, and the imports fell to 128,885 tons.

These statistics tell the story. The Louisiana mineral could be produced at such a low cost, and of such superior quality, as to defy competition, and its producer, the Union Sulphur Company, immediately took possession of its natural market as soon as it was ready to do so. The enormous industrial importance of this new supply was outlined in an article by Prof. Lunge, published in our columns a few months ago. Its command of the American market was inevitable; it was anticipated that it would also take possession of a considerable part of the European market. One cargo was, indeed, exported to France.

The Sicilian company awoke to its danger when the shipments from Louisiana began to assume large proportions, early in 1904, and negotiations for some working agreement were opened about a year ago. These have now been consummated in an agreement that the Union Sulphur Company shall limit its output to the requirements of the American market and a certain portion of the foreign market. In the latter the Louisiana product was subject to various tariff discriminations on the ground that it was a refined product, although it was shipped directly as produced from the mines. The method of mining, however, is simultaneously a method of refining for all practical purposes. A delicate legal point might have been involved in such a classification, but in any event offensive action by the American producer was bound to arouse the opposition of powerful interests abroad, and possibly retaliatory measures in this market by the Sicilian producer.

The compromise that has now been arranged was evidently decided by the American producer to be its best policy for the present at least. It will certainly be commended on humanitarian grounds, inasmuch as a large population in Sicily is absolutely dependent upon its sulphur mining industry, the condition of which has been unfortunate for a long while, in spite of efforts toward amelioration. It is the natural tendency of commerce to take advantage of reduction in the cost of production, but so sudden and far-reaching a revolution as there has been in the production of sulphur is quite exceptional in industrial history, and it is doubtless the wisest policy to create an artificial arrangement which will enable a gradual adjustment to the new conditions.

Geological Records in Mining.

It is only the most enlightened mining companies that have yet learned to appreciate the direct commercial value of a geological study of the developments in their mines. It is only the largest that can afford to maintain a special geological department. It will, however, pay a good many to retain a geologist, as we have argued in previous articles, and we expect to see such a practice become increasingly common. But even in the many cases where it may be decided impracticable to do that, it will certainly pay to keep more careful records of the disclosures made by underground openings than is usually done, even if it entails a little more labor on an already over-worked staff of employees, and even if the records be less complete and minute than if made by a trained geologist.

It is invariably a stumbling-block to the engineer sent to examine a mine, or to the superintendent sent to reopen an old mine, to find numerous workings inaccessible through caving or some other reason, and no record of what was found in them. Maps may have been preserved, but the indication of drifts run in various directions does not tell much of a story if it be not recorded what they showed. Maps containing any such records are decidedly the rarity. In fact it is generally considered a piece of great luck in connection with old workings if there be any maps at all. Inferences and negative conclusions may often be deduced from them, even if no positive data are afforded. Every engineer of experience has suffered from the lack of such data, that might easily have been recorded when the work was done, and many owners of property have suffered vastly more through the failure to develop ore resources that such data might have led to in the light of later mining knowledge.

The disregard of the commercial value of geological records in mining is sometimes nothing short of the absurd. We recollect the case, in a district where explorations are made solely by diamond-drilling, of an owner of property who spent $20,000 in the prospecting of his land. The borings were considered to have disclosed a promising orebody. A shaft was sunk to open it, but the result was unsuccessful and operations were suspended. Several years later, it appeared from the developments in an adjoining property that the occurrence of the orebody in the first had probably been misunderstood and a more intelligent plan of development would likely be successful in making a mine. It was found then, however, that all records of the original borings had been lost. The cores themselves had been partially lost, and what remained had been hopelessly mixed up. The jumble in the core-house indicated that some good ore had been found, but as to where or at what depth there was no evidence. The money expended in the borings had been practically all thrown away, simply through failure to preserve the record and hold it as an asset of value. With such a record, the drilling of check holes and additional holes would have been a comparatively inexpensive matter.

The man who is developing a mine may overlook many phenomena which the trained geologist would regard as important evidence, but he has the advantage of being in the mine every day and observing what is disclosed foot by foot. It is most useful to have a geologist, especially charged with such observation and nothing else, but where such an expert cannot be had, somebody should certainly be required to note and record all facts observed, and such records should be carefully preserved. The results would be of more or less value according to the competency and fidelity of the observer. The system would be somewhat analogous to that which is carried out in meteorological observations, wherein there is a corps of trained experts, who observe all the phenomena, and a corps of volunteers, who observe such as they can, but in mining the observations would be of direct benefit to the persons interested, that is to say, the owners of the mine.

The Copper Market.

The position of copper for several weeks has been peculiar. The extraordinarily active market of a few weeks ago has passed over, and quotations have been made only on transactions of moderate amount. At the period of highest activity most of the large consumers had, apparently, made up their minds that a high range of prices had come to stay. Most of them were, indeed, in immediate need of supplies; but most of them at the time bought for more than their pressing requirements, and are consequently now provided with stocks, either actually in their warehouses or arranged for by contract, in unusual quantity. The recent market has been, therefore, to some extent at the mercy of speculators who have had little trouble in making nominal prices, with considerable fluctuation. This does not mean that there have been no actual transactions, but these, for the time, have been comparatively small, because both the large producers and the large consumers have been out of the market.

Besides the consumers who are well stocked for the present, there are some large manufacturers who do not concern themselves to any great extent with the daily range of prices. It is their custom to cover themselves by yearly or other long contracts, with due provision for the settlement of prices. An advance interests them, of course, but not to the extent that it interests the ordinary buyer. They have no effect upon the current market, except so far as the extent of their requirements practically reduces the quantity of metal to be sold.

At the present time there is no doubt that copper is in an essentially strong position. As we showed in this JOURNAL for September 9, the increase in production this year has been offset by consumption at a rate greater than has ever been known in this country. Construction work of all kinds—especially electric work, in which copper is essential—is going on at an unprecedented rate almost all over the country. All branches of manufacture in which copper is used are extremely active. Large crops—which, after all, are the basis of prosperity—are now assured for this year, so that there is every reason to believe that activity in manufacturing will continue well through 1906. In the face of this great domestic consumption exports have increased, a lessened demand from Europe having been more than made up by the buying for China, a new feature of the market. Apparently use will be found for all the copper our mines can supply, as well as for the growing quantities which are sent here from Mexico and Canada to be refined.

At the present time, the strength of the position is shown by the undoubted fact that there are nowhere any large stocks available for early sales. All the large producers report their output closely sold up for the remainder of the present year, and a buyer needing large quantities for immediate delivery would have considerable difficulty in placing his orders. In some quarters we hear of great speculative stocks held back; but no one can locate these mysterious supplies, and the best opinion is that they exist only in the imaginations of those who would like to use them to affect the stock market. As we said in the article above referred to, only the usual, normal stocks exist at the present time; and, to put it briefly, spot copper is scarce.

In fact, the demand in this country is so strong that there have been recently large purchases of Chile bars in London for shipment to our refiners here. There has been much talk of re-sales of copper sold to China, but the quantity available from that source is not likely to be large, in any event. The total quantity exported to China has been only a little over 30,000 tons, and at least a part of this

has gone into consumption and is beyond reach.

Under these conditions, there is little reason to doubt the continuance of good prices for copper for, probably, a year to come. We do not mean to say that there will be no recession from today's, or last week's quotations; but there is every reason to believe that the metal will continue to bring a price which will be profitable to producers everywhere, and will tend to bring out new sources of supply; that is, to induce present producers to extend their operations, and to encourage the opening of new mines wherever possible.

Improvements in Ore Concentration.

One of the most important of the recent advances in the art of treating ores has been in the methods of concentration. By this, we refer more explicitly to ore dressing, inasmuch as all metallurgical processes are methods of concentration of the valuable metals contained in the ore, up to the point where the final product is arrived at. Considered in this way, smelting processes of all kinds are means of concentration, which is effected by eliminating the gangue of the ore in the form of a worthless slag. Smelting is, however, in general an expensive process, and the less slag that has to be made the better. This appears very clearly in a consideration of different kinds of smelting.

For example, in zinc smelting, which per ton of ore is comparatively expensive, the ore to be smelted must be already of comparatively high grade; otherwise it is uneconomical to effect concentration in that way. Ordinarily, in zinc smelting by the Belgian process, it does not pay to eliminate a gangue amounting to more than 50 per cent of the ore smelted, but the Silesian process, which is cheaper per ton of ore, permits a higher degree of concentration. Lead smelting, on the other hand, is less costly per ton of ore, and it is economical in that process to eliminate a much higher proportion of worthless material in the form of slag, which in ordinary practice may amount to 90 per cent of the charge smelted. This is equivalent to the statement that lead smelting is economically performed when the ratio of concentration is as high as 10 to 1. Copper matte smelting is even more economical than lead smelting, and concentration can be economically effected at ratios of 50 to 1.

Processes of mechanical concentration are much cheaper than even copper matte smelting, but their lower cost is to a considerable extent offset by their lower percentage of metal extraction. Those factors determine the extent to which it is economical to carry mechanical concentration. In general, however, it is more profitable to eliminate mechanically the worthless gangue of an ore by mechanical concentration than by smelting. In many cases, mechanical concentration is absolutely essential, as, for example, in the treatment of extremely low-grade ore, like the copper ore of Lake Superior, the galena ore of Southeastern Missouri, and the disseminated copper ore of Bingham, Utah. Moreover, mechanical concentration may effect a separation of minerals into two or more products that are each valuable. In other cases still, it may effect the elimination of some objectionable impurity of the ore.

Mechanical concentration is an ancient art, but during the last ten years it has experienced some remarkable improvements, which have revolutionized the practice; and it appears probable that there will be still further innovations of a character not yet clearly foreseen, except by some inventors who are working on special lines. The modern art of ore dressing may be considered to date from the appearance of the Wilfley table, in 1895, which was a very fortunate event for the mining industry. Since then, many other tables of the same type have been introduced, while moreover the modern magnetic separator has been developed.

Even as recently as five years ago, there were practically no methods of mechanical concentration except hand sorting, jigging and washing on tables, and magnetic separation, the last method having no general application. Since then the magnetic separators have been greatly improved, and radically new processes like electrostatic separation, oil concentration, and the flotation of minerals in acid baths have been invented.

In these ways it has become possible to separate a wide range of minerals of close specific gravity that cannot be separated by ordinary jigging or slime washing. Blende can be separated from pyrite, marcasite, and other minerals of approximately the same specific gravity. Bornite and chalcopyrite can be separated from blende, and also from certain of the heavy gangue minerals. Chalcopyrite and pyrrhotite can be separated from each other. Phosphate rock can be separated from hornblende. Molybdenite, monazite, and other rare minerals can be separated from their gangue, which frequently it is difficult to do by any ordinary method of gravity concentration. Graphite can be separated electrostatically from its gangue, and it is not unlikely that such a process will before long be developed commercially. Experiments have been made on the separation of native copper from its gangue at Lake Superior, under conditions where wet concentration failed. The experiments were to a certain degree successful, although not commercially successful; however, it may be only a question of time, or of some minor improvements, before complete success may be attained.

Up to the present time, the importance of these new processes has been greatest in connection with the separation of zinc blende from the minerals with which it is commonly associated. Attention has been especially directed toward zinc ores for two chief reasons, namely, the impurities in zinc ore are especially objectionable, and there has been a shortage in the supply of zinc ore and consequent enhancement of its value, which has made efforts in that field especially attractive. If it had not been for these new methods of ore concentration, it is likely that at the present time there would have been a zinc famine; certainly there would not have been in the United States sufficient ore to supply the demand.

As yet, the new processes of ore concentration are only in their infancy. Probably few realize the probable extent of the development which they will experience during the next ten years, or what results may be achieved by them. It is quite certain that no single process is a universal panacea for all the difficult problems of ore treatment. For certain ores, one process is best adapted; for other ores, another process. For still other ores, the best results may be achieved by a combination of two, or three, or even more, of the special processes. This is a direction of effort that has not yet received very much attention. It will be, however, the logical result when the design of such ore-dressing plants passes out of the hands of the promoters of special processes, into those of the engineer who is retained by his client to secure the best results.

Metallics.

Whenever more than 100 cu. yd. of concrete masonry is to be laid, it will frequently pay to instal a mixing apparatus; a home-made affair may be employed with entirely satisfactory results.

One reason for the economy that is shown in the construction of flues having a parabolic section is that the parabola is the one form in which, under uniform loads, there is no shear. The flue usually has only its own weight to sustain, and the fact noted above can therefore be taken advantage of in designing.

The ore shipped from mines to reduction works ranges in size from 16-in. cubes down to the finest particles. Some smelters, however, refuse to receive ore in excess of 10-in. cubes, which is the opening of the largest Blake crushers in common use, except at an extra charge, to compensate for the sledging and additional expense in crushing.

The design of crushing rolls in which one is made 2 or 3 in. wider than the other (so that the narrower may wear into the wider, forming a flange on either side) is bad. Equally bad is the design in which one roll is purposely made with a flange. These designs increase the friction (*i.e.*, power required), decrease the capacity of the rolls, and increase the cost of maintenance.

It is a good scheme, where the plant shuts down over Sunday, to remove the belts from the pulleys, and allow them to remain loose until ready to start up again. This gives the material an opportunity to shorten itself by contraction, and will lengthen the life of the belt accordingly, as its elasticity is not so soon impaired. Warm neatsfoot oil applied to leather belts will help along the process of shortening.

On electric railways, bonding of the rails is rarely proportioned properly; cases have occurred where an entire section of rail is depending upon the earth as a conducting medium between rails that should have a good electrical connection. Other cases are reported where the bonds have been of sufficiently high resistance to burn the crossties (through their heating) when the latter were exposed and in contact with them. This is especially apt to be the case with the mine tramway or works tracks; sometimes in these cases no bonding whatever is provided, from a mistaken economy. This practice will make itself apparent at the coalpile, if nowhere else.

One reason for the retention of the old type of simple locomotive engine is that the compound does not show the same percentage of economy in this work as it does for stationary practice. The simple locomotive, when running at high speed, uses the steam to greater advantage, perhaps, than any other form of engine. This is due to its being used expansively; on runs of 30 to 40 miles at high speed the cut-off will occur sometimes at one-eighth to one-sixteenth of the stroke. The lowest cut-off at which the simple stationary engine is ordinarily operated is at one-fifth the stroke. The ordinary hoisting engine usually takes steam at nearly full stroke, and so in fact does the locomotive in starting.

Two electric locomotives of an unusual type, constructed (by Hurst, Nelson & Co., of Motherwell) for the Great Northern, Piccadilly & Brompton railway, are being fitted up with storage batteries. The locomotives are to be utilized for hauling flat cars in the removal of excavated material, and in bringing in the equipment for railway construction. The main floor is composed of steel girders and plates; upon this is built a casing or tank, running most of the length, which contains the storage battery; as this provides the power, there are no collector shoes. Its free-running speed on the level, when hauling a load of 60 tons, is expected to be from seven to nine miles an hour. The batteries will be capable of operating for a whole working day without recharging.

Zinc forms with iron a series of alloys which are generally hard, white and brittle. A fine-grained alloy containing about 95% zinc and 5% iron, which is darker in color than pure zinc, is produced in the process of galvanizing. This is known as "hardhead," or "hard zinc." Alloys richer in iron are obtained by liquating "hard zinc," and fusing the friable residue; alloys with as much as 30% iron being produced in this manner. They are also prepared by immersing clean iron wire or sheet in zinc heated to near its boiling point. These alloys find industrial application in the manufacture of "delta metal," and similar compounds, which are brasses, with the addition of from 0.25 to 4% iron. The iron imparts hardness, toughness and tenacity, and the alloy can be rolled hot or cold.

The "whiskers" on dynamite that has been frozen is the source of considerable danger. The name is applied to the minute feather-like crystals that gather on the outside of the yellow wrapper in which the explosive is wrapped. It almost invariably is high in contents of nitro-glycerine (or gelatine) and is more dangerous than the dynamite itself. A case on record is where sticks of dynamite had been thawed out in hot water, and had then been placed in the holes preparatory to firing the shot. The can in which the sticks had been thawed out was left in the blacksmith shop without emptying, the scum (or combination of grease and "whiskers") being left on the top of the warm water. The first blow of the blacksmith's hammer was sufficient (by the concussion produced) to explode the contents of the can, fragments of which were projected in every direction, fortunately, however, without serious damage.

Every instrument man should know how to adjust both transit and level. The operation is simple; it is described in almost all catalogues of instrument makers, and there is no good reason why work should be delayed by sending the instrument to the maker for adjustment. The engineer who is used to making his own adjustments will, where the work is important, usually do this every day before starting in. If this rule is followed, he will obtain far more accurate results; and even though the adjustment may not often be made, the ability to effect it will enable him in general to reduce the probability of error in the actual manipulation of the instrument. Even if he should not be able to make the adjustment more accurately than most makers do, the results will still be better than if dependence is placed upon their work; for the transportation of the instrument from the factory is almost always sure to result in its being thrown out of adjustment to a greater or less extent.

The use of carbon brushes for generators and motors has become so general that a few words regarding the points that have led to their extended use may be opportune. For voltages over 100, this material gives the best results, and is used for even low voltage work in electrolytic plants, though its advantages are not then so apparent. The tendency of carbon brushes, as compared with those of copper, is to prolong the life of the commutator; their use, in fact, helps to form the smooth glass-like polish that is aimed at by the dynamo tender. The dust formed by their wearing away is also less deleterious than that formed by copper brushes, for the carbon is of comparatively great resistance, having, say, 3% of the conductivity of copper as used for this purpose. Of course, a greater area of cross-section is required with carbon than with copper brushes, but this is not a disadvantage; the larger area bearing on the commutator serves to wear both it and the brush more evenly; and to prevent chattering. Copper brushes are almost invariably set too tightly and, indeed, it is almost out of the question to set them loosely enough to avoid considerable wear. The copper dust that flies about where brushes of this material are used is sometimes the cause of short-circuits, but this rarely or never happens when carbon brushes are used. Brushes of carbon and graphite mixed have been used to some extent; the friction in this case is less on account of the lubricating properties of the graphite, and its higher conductivity enables the use of a fewer number of brushes on machines generating or using heavy currents.

Colliery Notes.

The separation of coal, by washing, from the various impurities with which it occurs, depends on the respective specific gravities of the various substances. The sp. gr. of bituminous coal is 1.35; that of slate and ordinary rock about 2.7, and of iron pyrite 5.

Recently the steamer *James P. Walsh* made a record for rapid unloading of coal on the Great Lakes. This vessel unloaded a cargo of 9,304 tons of bituminous coal (at the dock of the Milwaukee-Western Fuel Co., at Milwaukee, Wis.) in 30 hours. Of this cargo 2,000 tons was placed on the dock. Eight clam-shell buckets were used.

One of the best, if not the best, ways of preventing or stopping a squeeze in anthracite coal mines, is by flushing in material and filling up the worked-out portion of the mine. When once the top commences to settle over an area of any considerable extent, individual props are like so many matches. Cribs built of logs and filled in with rock may be effective, if enough of these supports are used in time.

Mine cars for collieries are used, of all shapes and sizes, and of gauges varying from 2 ft. to 4 ft. 8½ in. (narrow to standard railroad gauge). In many thin seams a low, broad car is used; this type has two prominent advantages, namely: The center of gravity of the load is close to the axle, thus insuring steadiness of motion; and also the loader's energy is economized in throwing the coal to a minimum height in loading.

It appears th t a descending order of working coal beds would be inadvisable in watery strata, owing to the greater risk which would then be incurred of flooding the lower workings by accumulations of water from above. In the absence of this danger, a descending order of mining is generally preferred. It has been pointed out that the lower seams are thus, to some extent at least, protected by an elastic cushion above.

The North End Coal Co., near Scranton, Pa., has the breaker platform (or the "plates") at the surface in a special building outside of the breaker proper. Here the coal is dumped from the mine cars, the large pieces of slate and rock are removed, also any other foreign material that may have been loaded up with the coal in the mines. After being thus cleaned, the coal is sent to the top of the breaker, by an inclined conveyor, where it goes over bars to rolls, and then to screens.

Various classes of coals are recognized in this country at the present time. These classes depend largely upon physical characteristics rather than upon chemical composition, and consequently they cannot be accurately defined. The divisions into anthracite, semi-anthracite and semi-bituminous are fairly satisfactory; but the term bituminous embraces so large a variety of coal that it is of little value, and the term lignite is so loosely applied that it has little or no place in a scientific classification.

The *Thomas W. Lawson* (a vessel which has received its full share of attention in the illustrated press) is one of a fleet of 12 vessels owned by the Coastwise Transportation Co. This company is controlled by the Consolidation Coal Co., and represents the coal-carrying service from Baltimore and Philadelphia to Eastern receiving ports. The vessel mentioned has attracted no little comment from being seven-masted, but she is also noteworthy by reason of her capacity of 8,250 tons. This amount of coal would fill 206 forty-ton coal cars.

An electrically driven Rateau fan is used in a shaft of the Saar-Mosel Colliery Co., in Germany. This fan displaces 110,000 cu. ft. of air per min., and is driven by a three-phase motor of 5,000 volts, direct-connected, and running at 300 r. p. m. It is stated that every three weeks the motor is cleaned, and every three months fresh oil supplied for lubrication, otherwise no one opens the door of the fan-house, which is ordinarily kept locked. Furthermore, the fan has been running under these conditions satisfactorily and continuously for a year.

It is often assumed that there will be an increase in temperature of one degree F. for every 60 ft. in depth in mining operations. H. W. Martin states that (from his figures) the discrepancy between this commonly accepted variation and that actually obtained by observations in various mines is considerable. For example, in South Wales, a temperature of 98° F. would not be encountered until a depth of 6,800 ft. is reached; whereas by the ordinary assumption, this temperature should be reached at a depth of 2,930 ft. This increase varies with different coalfields.

In many of the old culm banks in the Pennsylvania anthracite field, there have been deposited coal, rock and boiler ashes, from former mining operations. Difficulty is sometimes experienced in handling the ashes and rock, when flushing coal into conveyors in washery operations. The North American Coal Co. (the largest individual washery company) uses a number of separate conveyors at the bank, exclusively for moving ashes and rock. These waste conveyors pass over the coal conveyors and at right angles to them. Generally ashes and rock are shoveled from the working face of the culm bank, or are loaded into wheelbarrows, a much slower and more expensive method of handling the material, in large operations, than by mechanical means.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Enrichment in Fissure Veins.

Sir—It is impossible to answer, in figures, your questions as to enrichment and width of fissure veins, because the depth of the rich orebodies varies in different localities, with climatic conditions, the metallic content of the ore and the geologic matrix. For instance, the richest ores in gold-bearing fissure veins are usually nearer the surface than the richer portions of copper-bearing veins. The copper of the copper-iron ores is more soluble at the immediate surface and will be carried further downward than the gold of the gold-iron ores.

In the gold-iron ores the less soluble gold is left behind in the upper portion of the vein, while the soluble vein is removed, or, at least, disassociated from it. Furthermore, the copper ores being soluble, produce in their descending circulation a variety of enriching chemical combinations not known in gold veins.

I do not recognize your broadly stated principle that veins do not, as a rule, increase in richness with depth. Copper veins most certainly do increase in richness with depth for a considerable distance. Every vertical or sub-vertical copper or fissure vein consists of three distinct parts in descending order. The upper portion is a zone of impoverishment from which copper values have been extracted by solution. The next lower zone is one which has been enriched by the deposition of values from the overlying impoverished zone. The last zone, the unaltered chalcopyrite, is usually less rich and less valuable than the middle zone of enrichment.

The depth of this middle zone of enrichment varies with climatic conditions. It is my opinion that it is of greater depth and richness in arid regions than in humid ones, but some authorities believe to the contrary. My reasons for this opinion are too lengthy to be presented here.

No generalization can be made in reply to your second question concerning the widening or pinching of fissures with depth. Theoretically, all fissures should close at great depth below the crust, but there is no definite proof of this in nature. True faulted fissures extend as far in depth as human minds can follow them. Some other fissures certainly terminate and pinch a short distance from the surface. Many of the true fault fissures pinch and widen in lenticular arrangement, and in some cases the miner

has abandoned very important veins owing to the failure to understand this principle.

A general impression gained from some fields of mining and older text-book geology is current that most orebodies occur in crustificated quartz gangue between the separated walls of well-defined fractures. Current investigation is revealing the fact that many of the largest and most important orebodies do not occur in this orthodox manner; and that while fissuring, which affords openings for the circulation of water and vapors, is always important, the ore is often found, not in the fissure itself, but as a replaced constituent in the adjacent country rock or filling the interspaces of crushed breccia along the faulted zone.

The gold in the great Homestake mine is carried in a very ordinary looking schist. The same is the case with the copper at Ducktown, Tenn., and La Dicha, Mexico. The gold at the Carmen mine at Guanajuato, Mexico; Mulatos, Sonora, Mexico; Tonopah and Goldfield, Nevada; and the Strawberry creek district of the Black Hills, occurs in the altered rhyolite adjacent to fracture zones. The great copper bodies of the southern Arizona province, including northern Sonora, are largely the results of metasomatic replacement in quartz porphyries, contact metamorphism and in limestone. In this connection, every mining man should read the valuable paper on the "Genesis of the Copper Deposits of Clifton-Morenci, Arizona," by Waldemar Lindgren, published in the *Transactions* of the American Institute of Mining Engineers, 1904.

Inasmuch as the JOURNAL has already said it, I do not consider it inappropriate to repeat that the geological conditions of ore deposits vary in nearly every camp, and that the study of these conditions can be best made by a mining geologist. Such studies are just as important, or even more important in many instances, than those of the mining engineer, who deals with questions of measurement and equipment.

It may also be added that of the many hundred geologists in our country, perhaps less than a dozen understand or follow this particular branch of geology pertaining to the laws of ore deposits and their relation to practical mining, although it is to be hoped that other colleges beside the one honored by Prof. Kemp will some time awaken to the importance of the subject.

ROBERT T. HILL.

New York, Sept. 18, 1905.

Some low-water alarms for boilers are made dependent for operation upon the melting of a fusible alloy exposed to the heat of the steam. When the water falls and the temperature rises, the melting of the alloy releases a weight-actuated circuit-closer and rings a bell.

New Publications.

Proceedings of Second Conference of Engineers of the Reclamation Service. By F. H. Newell. 267 pages. Size, 5¾ by 9 in. Paper. Price, $1. Washington, 1905. Government Printing Office.

Report of the Royal Commission on Ventilation and Sanitation of Mines. The Hon. Robert Hastie, M.L.A., Minister of Mines of Western Australia. Size, 8 by 13 in. Paper. Price, $2. Perth, W. A., 1905. Wm. Alfred Watson, Government Printer.

Soils and Fertilizers. By Harry Snyder. Pages, 294. Illustrated. Size, 5½ by 8 in. Cloth. Price, $1.50. Easton, Pa., 1905: Chemical Publication Company.

Contents.—Physical properties of soils. Geological formation and classification of soils. Chemical composition of soils. Nitrogen of the soil and air, nitrification and nitrogenous manures. Farm manures. Fixation. Phosphate fertilizers. Potash fertilizers. Lime and miscellaneous fertilizers. Commercial fertilizers. Food requirements of crops. Rotation of crops. Preparation of soils for crops. Laboratory practice.

This is a new edition of the work, which was published originally under the title, "The Chemistry of Soils and Fertilizers."

Strength of Beams, Floors and Roofs. By Frank E. Kidder. Pages, 222. Illustrated. Size, 5½ by 8 in. Cloth. Price, $2. New York, 1905: David Williams Company.

Contents.—Determining the strength of wooden beams. How to determine the strength or safe load on wooden floors. How to compute the size of floor timbers for new buildings. Types of wooden roof trusses. Determining the stresses in roof trusses. How to compute the size of truss members. Proportioning the joints of wooden roof trusses. Wind-bracing of buildings, towers and spires. Examples of truss construction.

This book is a compilation of a series of articles contributed by the author during the last six years to *Carpentry and Building*. Its scope is well indicated by the table of contents, as stated above. The subject is treated in a thoroughly simple and practical, but at the same time, authoritative manner, as was to be expected of an author of such distinction as Mr. Kidder. Although it is not written for the engineer, it will be useful to him. It will be especially useful to the carpenter, builder and millwright. The examples of truss construction, presented by that guild and criticized by Mr. Kidder in his last chapter, indicate the necessity for instruction in framing and designing. Mr. Kidder expresses the hope that this book will be of practical value to a great many carpenters, and result in a more intelligent use of building material. We have no doubt that it will be.

The Pennsylvania Anthracite Law.

BY R. W. RAYMOND.

The central difficulty of the anthracite labor problem was not discussed by the Roosevelt Commission of 1902. It lies in the State legislation on the subject, and particularly in the act, approved July 15, 1897, "To protect the lives and limbs of miners from the dangers resulting from incompetent miners working in the anthracite coal mines of this Commonwealth, and to provide for the examination of persons seeking employment as miners in the anthracite region, and to prevent the employment of incompetent persons as miners in anthracite coal mines, and providing penalties for the violation of the same." This title, long as it is, does not cover the main purpose and effect of the law. It should have the additional clause, "Also, to render practically impossible the engagement of competent anthracite coal miners during a strike, and against the will of the strikers." According to this law:

1. No person "whomsoever" may be employed as a miner in any anthracite mine who has not registered in that district a certificate of competency issued by the Miners' Examining Board of one of the eight anthracite districts of Pennsylvania.

2. In each of these districts, the said Examining Board consists of nine men, all of whom must be "appointed from among the most skillful miners actually engaged in said business, in their respective districts, and who must have had five years' practical experience." They serve for two years. It is not provided that, upon ceasing to be "actually engaged" in anthracite mining, a man once appointed on such a board shall cease to be a member thereof; and I suppose it follows that if any or all the members of the Board engage in a strike they are still authorized to examine, and accept or reject, the applicants who desire to fill their places.

3. Each Board is directed to meet once every month, *and not oftener;* and its sessions must be public, and must not continue more than three days. No matter what exigency may exist, three days of public sessions must comprise all that the Board can do in a month. Clearly, this provision has nothing to do with the securing of competent miners. For that purpose, such a body could sit, if necessary, as long as an ordinary court; and its decisions would be as likely to be wise and just on the fourth, or the thirtieth, day as on the third.

4. There is no obligation upon this board to sit three days, or half a day, or more than ten minutes, in each month. A nominal monthly meeting, adjourned immediately, would satisfy the law. But, lest a board might some day try to do its best, up to the maximum permitted, in dealing with applications before it, there is a further mandatory restriction. The board must put to each applicant personally at

least twelve separate questions, prepared by itself in the English language, and receive intelligent and correct answers from him. These answers may be made in any language; and, no doubt, in many cases they are made in other tongues, or so imperfectly as to require patient consideration or the aid of an interpreter. In addition to this examination, the Board must receive satisfactory evidence that the applicant has already served at least two years as miner or mine laborer, and sworn proof, from at least one "certificated" practical miner, "perfectly" identifying him as a mine laborer. Of course, a hostile or an intimidated Board might "kill time" in such proceedings so as to accomplish little or nothing. Or it might declare an applicant's answers or proofs unsatisfactory and reject his application. Its decision would be practically final.

5. But even an honest and fearless Board, uninfluenced by circumstances or crowds, and conscientiously doing its work, could not deal with more than four applicants in an hour. It is easy to see that, at that rate, the number of certificates granted during three days of public sessions (which, of course, means sessions held at reasonable hours, like those of ordinary courts) would be far too small to meet any pressing need for skilled labor. In short, without some evasion of the law, it would take a year to issue certificates to the skilled miners required for a single good-sized colliery.

The unmistakable purpose of all this is to put the anthracite operators absolutely at the mercy of the labor unions. When Mr. Mitchell (unwillingly, as in 1902, or willingly, as may or may not be the case next April) leads a strike, there must be no chance of procuring new men, however competent, to do the work which his men abandon. The mines must lie idle until public distress forces a surrender, or another Roosevelt intervention—*unless* it happens that a sufficient number of certificated miners refuse to join in a new strike, so that the production of coal need not stop altogether. It is to guard against this possibility that the membership of the unions is now so actively recruited.

The reasonable and legal theory of a strike is that workmen not under a time contract have a right to cease working if they do not like the conditions of payment; and if other men cannot be found competent and willing to work under such conditions the presumption is that the striking employees have justice on their stide. But a law which prevents this test from being fairly made is a travesty upon all equity and fair play.

Besides serving this evil purpose, the Pennsylvania law actually lowers the standard of skill and intelligence, by practically making service as a mine laborer for two years the only road to employment as a miner. The "mine laborers" are the employees, not of the operators, but of the miners. They are engaged without special examination as to their qualifications; and their work, which consists mainly in loading and pushing the mine cars, does not necessarily make thorough miners of them, though it may enable them to pick up enough knowledge to answer the questions of a friendly Board, and enough experience to do the routine work of miners—especially when the amount of a day's work is limited by union rules or traditions. In fact, they often learn more than if the professed purpose of the statute were strictly carried out. That purpose is "to protect the lives and limbs of miners from the dangers resulting from incompetent miners working in the anthracite coal mines," etc. But the law itself simply prohibits the employment or engagement, "as a miner," of any non-certificated person. It does not prohibit the doing of miners' work by persons not employed "as miners"; and I do not think it repeals that part of the Act of 1891 which, by implication, permits the firing of blasts, etc., by a miner "or other person," approved by the mine foreman. Thus it comes to pass that many mine laborers perform the work of miners for the certificated miners who hire them, and acquire in this way some knowledge of the business. Under this system, of course, the anthracite collieries are exposed to all "the dangers resulting from incompetent miners working" in them; for laborers learning to be miners can scarcely be classed as competent miners. Yet, if these laborers were not thus permitted to do miners' work, they would all know much less than some of them now do, when they graduate into full-fledged certificated miners, with the right to employ and superintend laborers of their own.

But it cannot be denied that, under this system, the average skill and reliability of certificated miners is declining. It is a case of in-and-in breeding, in which each generation inherits only a part of the virtues of the preceding one. Really thorough miners are becoming few—and the few are becoming old—in the anthracite regions, thanks to the legislative solicitude for "the lives and limbs," without due regard for the brains, of anthracite miners.

A commission has been taking testimony, for use in a case to be tried at Scranton next month, which is understood to involve the constitutionality of the Act of 1897, criticized above. I do not purpose to discuss this case now, or to express any opinion as to its merits. But I may properly say that, as a general rule, overwhelming proof of the unwisdom or injustice of a law does not necessarily establish its unconstitutionality. Bad and foolish laws usually require legislative, not judicial, remedies. Our State courts very properly recognize the power of State legislatures, representing the omnipotence of the people, to make whatever laws they choose, subject to the limitation set by the Constitution of the United States and the express prohibitions of State constitutions. The good intention of a legislature is not questioned, and its mistakes of policy are not corrected, by the courts.

Whatever may be the decision as to the constitutionality of the Pennsylvania law, it seems clear to me that the State legislature could save all its useful features, and remove the mischievous ones, by adopting one or all of the following measures:

(1) Making the law of the anthracite regions correspond to that of the bituminous regions.

(2) Providing that, when a member of a Miners' Examining Board ceases to be actually employed as a miner, he shall, *ipso facto,* cease to be a member of that body—in other words, that miners on strike shall not continue to compose the body authorized to grant or refuse certificates to applicants for the work they have abandoned.

(3) Prescribing some way (no matter how rigid its conditions of examination, etc.) by which thoroughly competent miners or graduates of technical schools, could be admitted on probation and advanced on practical proof of competency, without serving for two years as "laborers."

(4) Requiring the Miners' Examining Board to sit as often and as long as the number of applicants may necessitate.

(5) Providing; for exigencies in which the ordinary examining board will not, dare not, or cannot, hold the public hearings and issue the certificates needed to relieve public suffering through a coal famine caused by a strike, some other method of securing competent miners. For instance, let the board which now judges of the qualifications of foremen be authorized, in such an emergency, to decide upon the much smaller necessary qualifications of common miners. Or, let the proposed measure of last resort be something else, surrounded with as many safeguards as the extremest caution can suggest. And let it be set in operation only by proclamation of the governor of the State. The one essential condition is, that it shall not permit collusive and criminal delay in relieving the public distress. Judging from the past, we may feel pretty sure that no governor of Pennsylvania will show unreasonable haste in declaring the existence of such an exigency, and applying this peaceful remedy. But I think that any governor would be glad to do this, rather than humiliate himself by consultations with the leader of a strike, or risk his popularity by ordering out the militia, or declaring martial law.

Until something like this has been done, the legislature of Pennsylvania must submit to be regarded as the ignoble tool of an odious tyranny. Such disgrace would be truly lamentable; for Pennsylvania is one of the few States which have enacted elaborate mining laws, and the mining laws of Pennsylvania, as a whole,

exhibit the result of much careful, conscientious labor, and come very near to constituting an admirable code. With such amendments as would prevent their use in unjust support of either party to a private industrial conflict, they would command general approval; and the State might then be congratulated upon its care for the great industries upon which its wealth and prosperity are chiefly based, and for the workmen therein employed.

Iron and Steel in Sweden.

According to the report of Director-General Richard Akerman on the Swedish iron industry, the production of iron ore, which was 3,677,841 metric tons in 1903, was 4,084,647 tons in 1904, showing an increase of 406,806 tons, or 11.1%. The production of coal in 1904 was 320,984 metric tons.

The output of pig iron was 506,825 metric tons in 1903, and 528,525 tons in 1904; an increase of 21,700 tons, or 4.3%. There were 133 furnaces in blast in 1904; the average active period was 263 days, giving an average yield per furnace of 3,974 tons for the year, or 15.1 tons per day. The Swedish furnaces all use charcoal as fuel. The quantity of blooms made from pig iron in charcoal hearths—an industry now almost peculiar to Sweden—was 189,246 tons in 1904.

The production of steel ingots and direct castings was as follows, in metric tons:

	1903.	1904.	Changes.
Bessemer	84,229	78,577	D. 5,652
Open-hearth	232,878	252,832	I. 19,954
Total	317,107	331,409	I. 14,302

Last year there were reported, in addition, 1,162 tons of crucible steel ingots and 951 tons of blister steel; bringing the total make of steel of all kinds up to 333,522 metric tons. The ratio of steel to pig iron last year was 0.63, a high figure.

The production of finished iron and steel in various forms, is reported as follows, in metric tons:

Bars	181,775
Nail-plates and wire-rods	102,976
Other shapes	9 020
Plates	16,331
Tube-blocks and hollow-blooms	23,594
Total	333,696

Adding the charcoal blooms made direct from pig iron, gives a total of 522,930 tons of finished or semi-finished products. In this total, however, there is some duplication, as a part of the charcoal blooms is converted into bars and wire-rods, though a quantity is also sold and exported in the form of blooms.

The high quality of Swedish iron makes a strong export demand, not only for these blooms, but also for bars, wire-rods and other forms of iron and steel.

The wolfram production of Queensland in 1904 was 1,539 tons, valued at £161,635. The output from 1894 to 1903 was 996 tons, valued at £30,894.

The Nissen Stamp.

The Nissen stamp is of the individual mortar type, with a circular screen surface. It is primarily a circular mortar having a gravity stamp operated by the usual cam and tappet method, one stamp in each mortar. There are no corners in which the ore can accumulate, and all the ore fed into the mortar comes directly upon the die.

The circular screen is used as a means of presenting a surface that will be at all times substantially at right angles to the splash of the ore. This gives the ore a better chance to pass through, and therefore tends to reduce sliming, and consequently power consumption; or, what comes to the same thing, tends to increase capacity. The increased screen area per stamp acts toward the same results.

The Nissen mortar is applicable to any of the other types of stamp mills, with little or no change. Each stamp can be hung up and the mortar cleaned separately. The chuck-block mortar, which is shown in Fig. 1, is preferred in the Western mines. Fig. 2 shows a mortar arranged for inside amalgamation. The Nissen stamp is made by Fairbanks, Morse & Co., of Chicago, Ill.

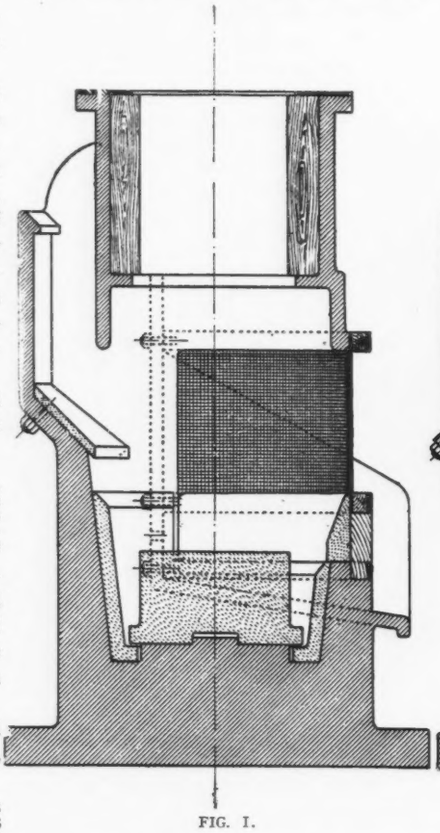

FIG. 1.

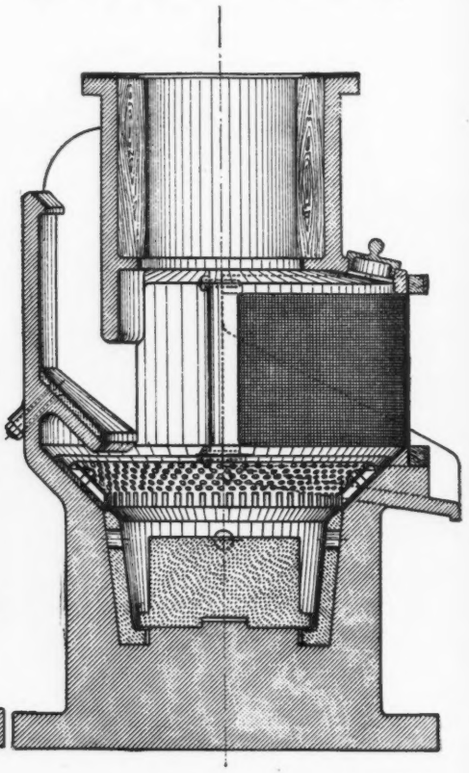

FIG. 2.

A recent patent is that for an alarm designed to give warning when an injector becomes clogged and fails to operate. The alarm is a whistle, automatically sounded by the back pressure of the steam when the injector becomes inoperative.

Treatment of Chromiferous Iron.

An invention calculated to increase the value of chromiferous iron ores has lately been patented by H. H. Campbell, of Steelton, Pa. (U. S., No. 795,193). Using iron ores containing from 1 to 5% chromium, he succeeded in producing a steel containing only 0.08% Cr. It is well known that, if steel has a content of Cr in excess of a certain small proportion, it is unfit for use for most purposes in engineering works; and also that it has not been practicable to make use of iron rich in Cr as a starting metal for the manufacture of steel on a profitable basis, especially on a large scale, because of inability to effect the economical removal of the Cr. Mr. Campbell's method is to first treat the chromium-iron in a basic bessemer converter, producing a basic slag, and then to oxidize the Cr by prolonging the blow beyond the usual period, which causes the Cr to enter the slag. The charge is then drawn from the converter into a ladle (having a device for drawing the metal from beneath the slag) and then stopping or controlling the flow of slag. The subsequent treatment depends on the final use for which the steel is intended. For low-carbon steel, where the de-chromized metal does not contain much oxygen, it is incorporated with ferro-manganese to obtain the usual reaction; where the de-chromized metal contains considerable oxygen, it is charged in a second converter having a silicious lining, with an addition of unblown molten iron (free from Cr and having a higher carbon content), and finally re-carburizing.

Mineral Production of California in 1904.

State Mineralogist Lewis E. Aubury reports the yield and value of the mineral substances of California for 1904 as follows:

Asbestos	Tons	10	$162
Asphalt	Tons	56,187	672,910
Bismuth	Tons	20	2,400
Bituminous rock	Tons	45,280	175,680
Borax (crude)	Tons	45,647	698,810
Cement	Bbl.	969,538	1,539 807
Chrome	Tons	123	1,845
Clay (brick)	M.	281,750	1,994,740
Clay (pottery)	Tons	84,149	81,952
Coal	Tons	79,062	376,494
Copper	Lb.	29,974,154	3,969,995
Fullers earth	Tons	500	9,500
Glass sand	Tons	10,004	12,276
Gold			19,109,600
Granite	Cu. ft.	520,487	467,472
Infusorial earth	T ns	6,950	112,282
Gypsum	Tons	8,350	56,592
Lead	Lb.	124,000	5,270
Lithia mica	Tons	641	25,000
Lime	bbl.	579,451	571,749
Limestone	Tons	40,207	87,207
Macadam	T ns	532,690	414 668
Manganese	Tons	60	900
Magnesite (crude)	Tons	2,850	9,298
Marble	Cu. ft.	55,401	94,208
Mica	T ns	50	3,000
Mineral paint	Tons	270	1,985
Mineral water	Gal.	2,430,320	496,946
Natural gas	M. Cu. ft.	144,437	91,035
Paving blocks	M.	3,977	161,752
Petroleum	Bbl.	29,736,003	8,317,809
Platinum			1,849
Pyrites	Tons	15,043	62,992
Quicksilver	Flasks	28,876	1,086,323
Rubble	Tons	1,764,208	1,227,209
Salt	Tons	95,968	187,300
Sand-stone	Cu. ft.	363,487	567,181
Serpentine	Cu. ft.	200	2,310
Soda	T ns	12,000	18,000
Silver	Commercial value		373,525
Slate	Squares	6,000	50 000
Soapstone	Tons	228	2,315
Tourmaline			65,000
Other gems			71,000
			$43,778,348

The above statistics are compiled from direct reports of the producers. A noteworthy feature in the statement is the great variety of minerals which the State now produces in commercial quantities.

Softening Water.

The use of barium carbonate for purifying water forms the subject of a communication by E. E. Bach (*Chem. Zeit.*, July 5, 1905). In the ordinary process for softening water, the temporary hardness, which is due to the bicarbonates of lime and magnesia, is removed by the addition of caustic lime, and the permanent hardness, which is caused principally by the sulphates of the same bases, is overcome by sodium carbonate. But the latter possesses the disadvantage that it produces sodium sulphate, which remains in solution along with the sodium chloride and sulphate already present. These alkali salts gradually accumulate and cause various troubles. Glauber's salt especially has a tendency to creep through joints and to render the boiler leaky. Barium carbonate precipitates calcium sulphate completely, the base as calcium carbonate and the acid as barium sulphate, and also removes sulphuric acid combined with sodium. Barium carbonate, however, possesses the disadvantage that as it is almost insoluble in water, it reacts slowly with the matter in solution. To overcome this practical difficulty, the firm of Reisert has devised and protected a process in which the water is admitted from below into a tank in spurts, thus stirring up the sediment. For the daily purification of 10,000 liters of water, 30 kg. of barium carbonate are introduced at the commencement, and a further 15 kg. every 14 days; the precipitated slime is partly removed from time to time, or may be left to accumulate for months, as it is found that the precipitation is more complete in its presence. As regards cost of chemicals, there is no great difference between the soda and the baryta processes, and in either case this expense is very trifling, as compared with the total cost of the softening.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week ended Sept. 19, 1905.

799,634. PRODUCTION OF METALLIC STRIP, WIRE, RODS, ETC.—Sherard O. Cowper-Coles, London, England.

799,642. PROCESS OF MINING SULPHUR.—Herman Frasch, Cleveland, O.

799,647. ORE-CRUSHER.—Peter Hart, Johannesburg, Transvaal.

799,684. ELECTRIC FUSE.—Henry N. Snyder and Lewis A. Hardison, Santa Paula, Cal.

799,687. EXPLOSIVE.—Everard Steele, Berlin, Germany.

799,696. TREATMENT OF SULPHIDE AND COMPLEX ORES.—Charles H. Ward, Sydney, New South Wales, Australia.

799,705. NITROGLYCERIN EXPLOSIVE.—Max Bielefeldt, Berlin, Germany.

799,743. PROCESS OF TREATING ZINC ORES.—Philip A. Mackay, Wenona, Ill.

799,744. REFRACTORY RECEPTACLE.—Philip A. Mackay, Newcastle, New South Wales, Australia.

799,745. METALLURGICAL FURNACE.—Philip A. Mackay, Newcastle, New South Wales, Australia.

799,746. REEL-OVEN.—Isaac J. Marsh, Deer Park, Canada.

799,770. PROCESS OF MAKING LEAD CARBONATES.—Adolf Wultze, Charlottenburg, Germany.

799,771. CONVEYER.—Lawrence Abraham, New York, N. Y.

799,795. BASKET FOR DISTILLATION OF WOOD, ETC.—Jean A. Mathieu, Georgetown, S. C.

799,827. CONCRETE FLUME.—William L. Church, Boston, Mass.

799,829. DAM.—William L. Church, Newton, Mass.

799,860. PROCESS OF GALVANIZING WIRE.—Guy L. Meaker, Evanston, Ill., assignor to the American Steel & Wire Company of New Jersey, a corporation of New Jersey.

799,861. ELECTROLYTIC APPARATUS.—Guy L. Meaker, Evanston, Ill., assignor to the American Steel & Wire Company of New Jersey, a corporation of New Jersey.

799,862. PROCESS OF SEPARATING FERRIFEROUS ZINC COMPOUNDS.—Guy L. Meaker, Evanston, Ill., assignor to the American Steel & Wire Company of New Jersey, a corporation of New Jersey.

799,870. STONE-SAW.—William B. Ruble, Riovista, Cal.

799,880. DRILL FOR MINING PURPOSES.—James Tonge, Jr., Westhoughton, near Bolton, England.

799,910. NODULE OF METALLIFEROUS MATERIAL.—Tom C. King, Marion, Ala., assignor to National Metallurgic Company, Jersey City, N. J., a corporation of New Jersey.

799,916. FEED-TRAIN FOR ROLLING-MILLS—Emil Meyer, Duisburg, Germany.

799,939. PEAT-DRYING APPARATUS.—Patrick Reynolds, Farnham, and Joseph A. R. Bedard, Quebec, Canada; said Bedard assignor to Joseph William Harris, Montreal, Canada.

799,966. SLAG-CAR COUPLING.—Benjamin H. Bennetts and Llwellyn J. W. Jones, Tacoma, Wash.

799,967. VALVE FOR OIL-WELLS.—Horace D. Bernard, Beaumont, Tex.

799,990. PULVERIZER.—George S. Knapp, Grand Rapids, Mich., assignor of one-half to Frank B. Chapin, Grand Rapids, Mich.

799,993. CONVEYER.—Christopher W. Levalley, Milwaukee, Wis.

800,004. HOLLOW PERCUSSION-DRILL.—Jeremiah Murphy, Leadville, Colo., assignor to Charles T. Carnahan, Leadville, Colo.

800,018. ANNEALING-FURNACE.—Ambrose Ridd, Newport, Ky.

800,041. LAMP-WICK.—William A. Wilson, Murphysboro, Ill., assignor of one-half to Patrick H. Strahun, Murphysboro, Ill.

800,089. PULVERIZING-MILL.—John H. Elspass, Denver, Colo., assignor to the Elspass Roller Quartz Mill & Manufacturing Company, Pueblo, Colo.

800,095. CONVEYER.—Christopher Flinn, Allegheny, Pa., assignor to Pressed Steel Car Company, Pittsburg, Pa., a corporation of New Jersey.

800,110. PLASTIC COMPOSITION.—John W. Ivery, Dillsburg, Pa.

800,113. APPARATUS FOR SEPARATING SOLID SUBSTANCES FROM LIQUIDS.—Francisco Kassian, Mexico City, Mexico.

800,127. APPARATUS FOR MINING SULPHUR.—Herman Frasch, New York, N. Y.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week ended Sept. 8, 1905.

20,265 of 1904. COAL-CUTTING MACHINE.—W. E. Hamilton, Zanesville, Ohio, U. S. A. Improvement in coal-cutting machines for making parallel cuts across the face, and for removing the blocks thus cut.

21,538 of 1904. DISPOSITION OF FLUE DUST.—A. Sahlin, London. Apparatus for removing dust from blast-furnace and similar gases, consisting of a revolving horizontal drum containing baffle-plates and water.

2,352 of 1905. ROCK DRILL.—R. Temple, Denver, U. S. A. In reciprocating rock-drills, improved methods of rotating the tool at each stroke.

6,534 of 1905. SLIME FILTER.—Bertram Hunt, Costa Rica. A continuous filtering apparatus for slimes, using the principles of drainage and pressure of a column of slimes combined for removing the liquid; consisting of an upright cylindrical body containing vanes all up its sides to allow the liquid to escape, with means for keeping the column of slimes of constant height and means for removing the solids at the bottom.

7,131 of 1905. SMELTING ORES.—P. & A. Weiller, Vienna. In smelting low-grade calcined copper ores, the addition of metallic iron to the charge in order to prevent the formation of silicate of copper.

10,032 of 1905. WELL DRILLING.—E. Frieh, Nordhausen, Germany. In deep-boring apparatus, driving the percussive tool by an electric motor attached to the tool, and making the tool and the core-protecting tube in one piece.

13,886 of 1905. ARTIFICIAL PUMICE.—H. Collosseus, Berlin, Germany. Injecting milk of lime into molten slag, and so producing an artificial pumice.

Week ended Sept. 15, 1905.

17,794 of 1904. SULPHURIC ACID PROCESS.—Societa Anonyma, L. Vogel, Milan, Italy. In the manufacture of sulphuric acid, passing the sulphurous fumes from the roaster into an atmosphere of atomized water before going to the lead chambers.

18,286 of 1904. STAMP-MILL.—D. A. Bremner, London. Improvements in mortar boxes of stamp-mills, for the object of prevention of choking at the feed, the facilitation of the discharge of pulp and the facilitation of the renewal of the interior linings.

13,101 of 1905. COAL-CUTTING MACHINE.—W. G. Cowlishaw, Stoke-on-Trent. Improvements in the Hurd coal-cutter, with the object of obtaining a truer alignment of the bearings which carry the rotary longitudinal shaft, and to enable the gear head and motor frame, after being turned to the desired angle, to be locked in position.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. B. Stanley Revett has been a recent visitor in New York.

Mr. R. J. Grant arrived in Denver from Australia a few weeks ago.

Mr. Frank Nicholson, of Joplin, Mo., has been a recent visitor in New York.

Mr. W. H. Kinnon, formerly of Denver, is at present located in Tucson, Arizona.

Mr. Theodore E. Schwarz, of Denver, Colo., is examining property in New Mexico.

Mr. David Christie, of Murphysboro, has been appointed a member of the Illinois State mining board.

Mr. E. W. Sebben, of Denver, is at present examining mining property in Yavapai county, Arizona.

Mr. W. E. Defty, who is now making examinations in Colorado, will be in Sonora, Mexico, in October.

Mr. Woolsey McA. Johnson, of New York, has returned from a professional engagement in New Hampshire.

Capt. Henry Stern, of New York, president of the Yampa Smelter Co., has returned from a visit to Salt Lake.

Mr. F. L. Bosqui has returned to San Francisco from professional trips to Goldfield, Nev., and Guanajuato, Mexico.

Dr. D. H. Lake has returned to Kingston, Pa., from a visit to Colorado, where he is interested in mining properties.

Mr. G. E. Alexander is manager of the Middle Yuba gravel mine at North Columbia, in Nevada county, California.

Mr. James Simmonds, of Halifax, proprietor of the Dartmouth, N. S., rolling mill, is on a tour of the Pacific coast.

Mr. Roger Taylor has been appointed assistant superintendent of the Tacoma Smelting Co., at Tacoma, Washington.

Mr. W. E. Parnall, superintendent of the Calumet & Arizona, has returned to Bisbee, Ariz., from a visit to Michigan.

Mr. Isaac Smith, manager of the Chase Creek Copper Co., of Clifton, Arizona, has been visiting Duluth, Minn., recently.

Mr. Rienzi W. MacFarlane, for some years engaged in mining in the Malay Peninsula, is now in charge of a mine in Mexico.

Mr. W. A. Prichard, of London, arrived in New York last week, on his way to California and Mexico, on professional business.

Mr. J. Parke Channing, of New York, recently visited the smelters and larger mines of the Boundary district of British Columbia.

Mr. T. A. Rickard, of New York, started for Mexico Oct. 5. He will visit several of the important mining districts of that country.

Mr. A. R. Shepperd, manager of the Batopilas Mining Co., has returned to Mexico from a visit to New York and Washington.

Dr. Joseph Hyde Pratt, of North Carolina Geological Survey, is on an extended trip in Arizona and Montana examining mining properties.

Mr. John H. Mackenzie, of Bradley & Mackenzie, San Francisco, has again been appointed manager of Le Roi Mining Co., at Rossland, B. C.

Mr. Ernest du B. Lukis, who has been engaged in mining in Mexico for several years, has gone to Peru, where he has a professional engagement.

Mr. O. P. Simpson, of Boston, Mass., and Mr. C. C. May, of Davenport, Wash., have been at the Trihune mine, at Golden, in Okanogan county, Washington.

Mr. F. S. Wanklyn, vice-president and general manager of the Dominion Coal Co., returned this week to Montreal after a visit to the mines at Sydney.

Mr. Donald G. Forbes has returned to Victoria, B. C., from the Canadian Yukon and Alaska, after having visited the principal gold camps from Dawson to Nome.

Mr. R. G. McConnell, of the Geological Survey Department of Canada, has gone to Windy Arm, Yukon Territory, where finds of rich gold-silver ore are reported.

Mr. W. J. Watson has been appointed manager of the Tyee Copper Co.'s smelter at Ladysmith, Vancouver Island, B. C. He succeeds Mr. Thomas Kiddie, who has resigned.

Mr. Frank H. Johnson, for many years a mine manager in South Africa, succeeds Geo. W. Root as superintendent of the New York Grass Valley mine at Grass Valley, California.

Mr. Kenneth B. Thornton has been appointed operating engineer of the Canadian White Co., of Montreal. Mr. Thornton is a past president of the Canadian Electrical Association.

Mr. Louis Cohen, late general superintendent of the Montezuma Lead Co., of Santa Barbara, Mex., is now in Denver, Col., where he has established an office in the Jackson building.

Mr. C. B. Kingston, of the firm of Pearse, Kingston & Browne, London, has gone to South Africa, where he will remain for some time. His headquarters will be in Johannesburg.

J. G. White & Co., of New York, have secured the services of Mr. J. F. Witmer, of Buffalo, N. Y., who will assume charge of special work bearing on hydraulic engineering in foreign fields.

Mr. Michael Frenette, foreman of the refinery of the Lake Superior Smelting Co., at Dollar Bay, Mich., has resigned, and will go to Cerro de Pasco, Peru, to take charge of construction work there.

Capt. Tom Hoatson, of Calumet, vice-president of the Calumet & Arizona, and a stockholder in North Butte, is visiting Butte, Mont. He is accompanied by Thomas Burt, a mining man of Calumet.

Mr. S. S. Fowler, consulting engineer, of Nelson, B. C., who is manager for the London & British Columbia Gold Fields, Ltd., has been examining gold properties near Rat Portage, Ontario, for London clients.

Mr. S. J. Speak, recently manager of the Ymir Gold Mines, Ltd., at Ymir, B. C., has joined Mr. Edward Hooper, of London, England, in partnership, the firm to be known as Hooper & Speak, mining engineers.

Mr. E. H. Cook has resigned his position as manager of the Santa Francisa mine, at Asiento, Mexico, and will engage in private mining and civil engineering work. His present address is Los Angeles, California.

Capt. F. A. Hill, of Renton, Wash., has been appointed general manager for the Canadian Coal & Coke Co., in place of Mr. G. H. Broome, resigned. This company's colliery is at Frank, in southwestern Alberta.

Mr. H. De C. Richards, general manager of the Orleans Bar mine in Humboldt county, and of the Albarty mine in Amador county, Cal., is in New York, on professional business. He returns to California this week.

Mr. G. D. Doveton, of Doveton & Purington, who for the past five months has been investigating the treatment of Cripple Creek low-grade ores, and the Cassel filter, has completed his work and returned to Denver.

Mr. Herman C. Bellinger, metallurgist, of Yampa, Utah, has been visiting Crofton, Vancouver Island, where is situated the smelting works of the Britannia Smelting Co., for which company he is consulting engineer.

Mr. William Hutcheson, Canadian Commissioner of Exhibitions, writing from Liège, Belgium, states that the Canadian exhibit there of economic minerals has aroused great interest among capitalists as to the Cobalt region.

Prof. D. H. Marshall, who has occupied the chair of physics in Queen's University, Kingston, Ont., since 1882 and for the past two years has been connected with the Kingston School of Mining, has retired from active duty.

President C. A. Wright of the Keweenaw Central Railway Co. and the Keweenaw Copper Co., has returned to his home

at Hancock, Mich., after a consultation with the Eastern interests in the corporations of which he is the active head.

Mr. A. J. G. Swinney, who was in charge of the mines and chlorination mill of the Ferguson Mines, Ltd., in Northern Lardeau, British Columbia, until last summer, recently left London for Spain, where he will examine some mining properties.

Mr. Cyrus Robinson, of New York, has been appointed consulting mechanical and electrical engineer of the Cia. Minera de Peñoles, of Mapimi, Mexico. He has also been appointed vice-president and general manager of the De Soto Mining Co., of Arizona.

Mr. Philip Argall, of Denver, Col., who has been appointed by the Department of the Interior, Canada, to assist Mr. Walter Renton Ingalls in preparing a report on the zinc resources of British Columbia, has commenced to examine zinc properties in the Slocan district.

Mr. T. Y. Oxnam, of Los Angeles, Cal., has resigned the position of general manager of the Palmarejo & Mexican Gold Fields, Ltd., of Mexico. He is succeeded by Mr. W. E. Pomeroy, of Palo Alto, Cal., who was formerly with the Boulder-Perseverance Co., of Australia.

Mr. Norman Carmichael, for the last 10 years connected with mining in the Nelson district of British Columbia, has resigned the management of the Highland mine, at Ainsworth, B. C., to take charge of some of the mines of the Arizona Copper Co., near Clifton, Arizona.

Mr. Carlton H. Hand, who had charge of the mines and mills of the Watseca company at Rochester, Mont., in which A. W. McCune, of Utah, is largely interested, is in Butte, having returned from Idaho, where he is mining the auriferous gravel of the Snake river on a large scale.

Mr. J. C. Gwillim, professor of mining at the School of Mines, Kingston, Ontario, which is affiliated with Queen's University, Toronto, left Blairmore, Alta., late in August to resume his duties at Kingston, after having spent several months in mining sections of southwest Alberta and British Columbia.

Prof. W. O. Crosby, of the Massachusetts Institute of Technology, Boston, has just returned from a trip to the Pacific coast, where he has been engaged on professional work. He expects shortly to leave for the Juneau district of Alaska, where he has engagements covering several months' work.

Mr. G. G. S. Lindsey, general manager of the Crow's Nest Pass Coal Co., has returned to Toronto from a trip to Europe. He is expected to shortly proceed to Fernie, East Kootenay, to deal with matters that have been in dispute between the local management of the company's coal mines and the miners.

Mr. Robert McF. Doble, consulting engineer of the Abner Doble Co., San Francisco, has returned from a trip of several months through the Sierra Madre mountains on the west coast of Mexico, and also in Colorado, where he was engaged in making examinations of several important hydro-electric long-distance power projects.

Mr. Joseph A. Coram, of Boston, who controls the property of the Mexican Consolidated Mining & Smelting Co. in the State of Durango, Mexico, and is also interested in Montana, is spending a few days in Butte. He is accompanied by E. L. White, president of the Bingham Consolidated in Utah, and consulting engineer for the Mexican Consolidated.

Obituary.

John F. Byers, senior member of the John F. Byers Machine Co., Ravenna, O., and inventor of the Byers hoist and contractors' locomotive, died on Sept. 17, aged 62 years.

Richard A. Healy, mechanical engineer and inventor, for a number of years at the head of the engineering department of the J. C. Todd Works, Paterson, N. J., died on Sept. 26, aged 66 years. He was born in London and came to the United States 40 years ago.

Maurice Heckscher, late vice-president and treasurer of the Richard Heckscher & Sons Co., iron manufacturers, died Sept. 29 at his home at Bryn Mawr, Pa., after a lingering illness. Mr. Heckscher graduated with honors from Harvard University in the class of 1887, since which time he has been actively engaged in business in Philadelphia. He was well known in the iron and steel circles of Pennsylvania. His widow and two daughters survive him. Funeral services were held at St. Mark's church, Philadelphia, Monday afternoon.

Societies and Technical Schools.

Lake Superior Mining Institute.—A circular from the secretary's office at Ishpeming, Mich., says: "The following is a general outline of the program for the Menominee range meeting, Oct. 17, subject to change by the committee in charge.

"*Tuesday.*—To visit the Chapin and Pewabic mines in the forenoon, leaving about noon for Crystal Falls, where the mines will be visited during the afternoon. The evening meeting will be held at Crystal Falls.

"*Wednesday.*—Visiting mines and points of interest around Sturgeon Falls and Vulcan. Evening meeting will be held in court house at Iron Mountain.

"*Thursday.*—Excursion to Escanaba, to visit various points of interest, after which a boat trip to Gladstone to visit the Cleveland-Cliffs furnace is planned.

"In order to enable the committee to arange ample accommodations for all, it is necessary that they be advised as early as possible of the number who will attend. The meeting promises to be one of the most interesting yet held, as the entire time will be devoted to the inspection of the iron industry."

Trade Catalogues.

The Scully Steel & Iron Co., Chicago, Ill., sends us its stock list for September and October, 1905.

The Billings & Spencer Co., Hartford, Conn., is now distributing its new list of drop-forged machine wrenches.

The second number of the monthly bulletin of the Ohio Brass Co. (Mansfield, Ohio) for September has just been issued.

The Link Belt Machinery Co., Chicago, Ill., is sending out two new pamphlets, one on "Washing Bituminous Coal" and the other on "Car Hauls." The first has some interesting matter. Both of them are well illustrated and of the standard 6x9-in. size.

We have the three bulletins of the Fort Wayne Electric Works, Fort Wayne, Ind., No. 1067, 1068 and 1070. They refer to transformers; the type M induction motor, and the series alternating current arc lighting system, as used by this company. They are well illustrated and well written.

The Cleveland Twist Drill Co., Cleveland, Ohio, sends us its two catalogues, of "Drills, Reamers and Gauges," and of "Tools for Turret Lathes and Screw Machines," respectively. Both are of the standard 6x9-in. size, well illustrated, and the first has a few good tables added to the reading matter.

The United States Steel Piling Co. sends out a flyer, entitled "Steel Sheet Piling." The illustrations show this piling assembled in such shape that it appeals to the mining engineer as a means of shaft sinking. Whether it can be applied to this purpose or not, however, remains to be seen. The company's address is Chicago, Ill.

Industrial.

The Imperial Cement Co., Montreal, Quebec, is being equipped with a pulverized-coal burning apparatus, supplied by the B. F. Sturtevant Co., of Boston.

The power plant of the Bureau of Printing, at Manila, P. I., includes two standard 50-kilowatt Crocker-Wheeler electric generators. One was installed last year and the other in 1901. The machines are operated by natives.

The business of quarrying marble has become closely associated with the installation of electrical plants throughout the United States. Marble is largely used as a mounting or backing for electrical switchboards, and marble quarries are required to supply a large amount of this kind of material.

J. W. McLeod, superintendent of construction for the Riblet Tramway Co., of Spokane, Wash., has gone to Loomis, Okanogan county, to construct a Riblet auto-

matic double cable system aerial tramway, a mile in length, from the Grand View mine to the mill recently constructed by the Grand View Company.

The S. H. Supply Co., Denver, Colo., is furnishing the following plants of new machinery: No. 2 Wild Mill, with all necessary machinery for a complete 50-ton concentrating plant, to California; No. 2 Wild Mill and complete plant to New Mexico; and a four-drill American compound compressor, with boiler, drills, etc., to Durango, Mexico.

The Barriett Electric Co., of Cincinnati, O., has recently reorganized under the name of the Barriett Electric Manufacturing Co. It will add to its line of motors and dynamos, blower outfits and buffing grinder sets with electrical attachments. C. H. Haddrell, formerly with the Westinghouse Co., has connected himself with the engineering department.

The Rapid-Economy Stamp Mill Co. of San Francisco, reports a lively demand for Richards' rapid-economy stamp mill. The company has just made a contract to equip the Castle Mont Mining Co.'s property in Tuolumne county, Cal., with a number of these stamps. A 3-stamp battery has been shipped to F. H. Elder for his mine in Humboldt county, California.

The Ingersoll-Rand Co., of New York, announces the establishment of a branch office at Houghton, Mich., under the management of T. F. Lynch, who has for several years past represented the Ingersoll-Sergeant Drill Co. in the copper and iron districts. At the new office a complete stock of repair and duplicate parts for all Ingersoll-Rand machinery will be carried.

The Bury Compressor Co., of Erie, Pa., reports that its export Southern and Western trade is gradually expanding in volume. Among several orders received from France and Belgium, through Fenwick Freres & Co. during the month of September is one for the French Government. The company has an exhibit at the International Exposition at Liège, Belgium.

The Sullivan Machinery Co., of Chicago, reports the addition of two branch offices to its list—one at Knoxville, Tenn., and one at Joplin, Mo. The Knoxville office, with quarters in the Houston building, is in charge of E. L. Thomas. Rock drills, stone channelers and quarrying machinery are carried in stock. S. A. Allison becomes district manager at Joplin. The new office is in the Keystone hotel block.

The Allis-Chalmers Co. announces several changes in its force: M. C. Miller, who joined the company a little more than a year ago, has been made assistant to the sales manager. He takes charge or all matters in that department which do not require the personal attention of the sales manager. Mr. Miller was formerly connected with the Westinghouse Electric & Manufacturing Co. at Pittsburg. O. A. Stranahan, who joined the company December 1, 1904, to become manager of the Power Department, has been promoted to the position of sales manager, with office at Milwaukee. W. T. McCaskey, who was until recently manager for Agar-Cross & Co., of London, and for years before identified with Edison, Westinghouse and other electrical interests, has joined this company and will act as a special representative where contracts are being considered for such work as the equipping of interurban railroads, hydroelectric projects and others requiring special knowledge.

Construction News.

Barboursville, Kentucky.—Ed. B. Dishman contemplates developing coal mines, and has not yet awarded contracts.

Central City, Colorado.—The owners of the Hattie Myrtle group are arranging to instal machinery. M. A. Wright is manager.

Silver Creek, Colorado.—New machinery is to be installed on the Reform group. James G. Kenney, of Denver, Colo., is owner.

Globe, Arizona.—J. C. Erman, of Globe, manager of the Live Oak mine, will equip the same with leaching and electrolytic precipitating plant.

Black Rock, Arkansas.—The Park Zinc Mining Co. has been incorporated with an authorized capital stock of $160,000. I. O. Denman is president.

Sugar Loaf, Colorado.—The United States Gold Corporation, Edward Monroe, president, is going to buy air compressors and instal a power plant.

Crossville, Tennessee.—The Weaver Coal & Coke Co. will erect a coke plant near this place. Wm. Ramsey, of Chicago, is general manager.

Reevesdale, Pennsylvania.—The Philadelphia & Reading Coal & Iron Co. is preparing to sink a large shaft in this district, and will erect one of the largest breakers in the region.

Squirrel Gulch, Colorado.—The Mount Theresa Gold Mining Co. is going to put in a power plant on Soda creek, to run air compressors. W. E. Curver, Idaho Springs, Colo., is manager.

Blue Wing, North Carolina.—The National Light & Thorium Co. has bought 300 acres of land near this place, in Granville county, and will need machinery for development work. The office of the company is in Youngstown, Ohio.

New Brunswick, New Jersey.—The Marine Manufacturing & Supply Co. is enlarging its works for the purpose of building mining machinery, and will purchase new tools and other machinery. The New York office is at 158 South street.

Knoxville, Tennessee.—H. B. Lindsay, of this place, together with four others, has purchased 6,000 acres of coal on Hickory creek, in Campbell county, and will organize the Campbell County Mining Co., with $250,000 capital stock, for the development of the tract.

Welch, West Virginia.—Land located on the Tug River near this place has been leased by W. A. Lathrop, of Dorranceton, Pa., for the Jed Coal & Coke Co., which intends to begin operations by erecting 200 coke ovens and developing coal deposits upon the property.

Bristol, Tennessee.—It is stated that the Virginia Iron, Coal & Coke Co. will remove its rolling mills at Max Meadows to this place, and make improvements which will increase the capacity of the plant from 1,000 to 1,500 tons per month. Henry K. McHarg, of 40 Wall street, New York, is president.

Denver, Colorado.—The American Zinc & Chemical Co. informs us that it has decided to rebuild its zinc-ore reduction plant at Denver, making it a 50-ton plant, with complete electric and modern conveniences of every kind. This plant will replace the one destroyed by fire on Sept. 5 last. The company's office is in the Farmers' Bank Building, Pittsburg, Pa. Fred. J. Shaler is secretary.

Crossville, Tennessee.—The Weaver Coal & Coke Co. has been chartered with $1,000,000 capital stock to mine coal and manufacture coke near Crossville. It is proposed to build a $100,000 coke plant. Henry E. Weaver, of Chicago, Ill., is president, and William Ramsey, of Chicago, Ill., general manager. The company has purchased 5,000 acres of coal land which will be developed; main office, Marquette building, Chicago.

Rutherfordton, North Carolina.—It is reported that C. W. Luce, of East Tawas, Mich., and associates have purchased the gold mine of the Monarch Gold Mining Co., which will be developed. It is stated that a cyanide plant will be installed and about $25,000 expended in developments.

The Beulah Gold Mining Co., of Au Sable, Mich., is reported as having purchased the gold-mining property of the Hoosier Gold Mining Co., near Rutherfordton, which will be extensively improved and operated.

Phil Campbell, Alabama.—The Louisiana-Alabama Coal Co., reported incorporated last week under New Orleans, La., with $200,000 capital stock, has purchased and will develop 3,320 acres of coal lands in Franklin county. It is proposed to instal machinery for a daily output of 400 tons at the start. W. S. Douglas, of Russellville, Ala., will be superintendent in charge of construction and operation. S. B. McConico is president; Sam W. Bowman, vice-president, and W. W. Girault, secretary-treasurer; main office, New Orleans, La.

Special Correspondence.

San Francisco. Sept. 27.

The merger of the dredging companies at Oroville, recently spoken of in these columns, includes 3,000 acres of prospected lands, of which 300 acres have been mined. About 200 acres are on the Feather river in Butte county, and 1,000 are on the Bear river, between Yuba and Placer counties. No Yuba county properties were included in the deal. This merger is independent of the effort made last spring to consolidate several dredging companies. The properties consolidated are the Boston & California Dredging Co., with three dredgers; the Boston & Oroville Mining Co., with three machines at work and another being built; the Bear River Mining Co., now building a dredge; and the Oroville Gold Dredging & Exploration Co., with two machines. The new company to operate these dredgers is called the Oroville Dredging Co., Ltd. Although it is an American company, considerable English capital has been invested. The company has been incorporated under the laws of the State of Maine, with a capitalization of $3,500,000, with 700,000 shares of a par value of $5 each. W. P. Hammon will be the general manager, Frederic W. Baker, of the Venture Corporation, of London, is president, and F. W. Batchelder, of Boston, treasurer.

A new dredge being built near Fairoaks, Sacramento county, is intended for work on the Nuttall vineyard, and will go into service about Nov. 1. It is of very large capacity. This is the third gold digging machine to be set at work in that vicinity. A large dredge is being constructed near the Feather river, east of Gridley, in Butte county, and two or three more are to be built in the same vicinity. The Yreka Creek Dredging Co., in Siskiyou county, has its machine running night and day near Yreka. Electric power is used.

There is a prospect of a revival of gravel mining in the Blue Ravine section of Sacramento county, a short distance above Folsom. At the New Blue Ravine mine on the Broder place, a shaft has been sunk, and rich dirt has been taken out at 60 ft., which is 15 ft. above bedrock. This is a new part of that section of country to prove of value for mining ground.

There is little doubt that many of the reports circulated as to the damage done by the Selby smelter on Carquinez straits, San Francisco bay, by the fumes, have been exaggerated. Some live stock and vegetation may have been damaged, but nothing to the extent reported. However, some individuals have commenced damage suits against the Selby Co., and the district attorney of Solano county also commenced proceedings. The chairman of the supervisors of the county states that the smelter people agreed to control the fumes and he agreed that if they did he would not press proceedings against them. But the company has not yet done as agreed. This company is about to erect a smelter on the shores of San Francisco bay to handle copper ores exclusively, to be separate from the works at Port Costa. It is understood that they will take all the ores they can get from the Pacific coast, but in order to have a constant supply will bring large quantities from Antofogasta, Chile.

The big smelter of the Mammoth Co., at Kennett, Shasta county, will be blown in very shortly. The smelter consists of three 250-ton water-jacket furnaces, with dust chambers to collect dust and fumes. The stack is of boiler plate steel, 150 ft. high and 12 ft. in diameter. The building for the furnaces is 130 by 70 ft. Behind this building are the bunkers, in which the fluxing-ores, lime-rock and custom ores are stored. The sampler adjoins the ore-bins. There are three blowers, each driven by a 200-h.p. motor. The capacity of the tramway for delivering ore is 1,600 tons daily; it is 2½ miles long. The entire cost of the smelting plant is about $500,000. The Afterthought smelter of the Great Western Gold Mining Co. is running steadily, making the fourth great copper smelter in Shasta county. This county produced in 1904 a total of 26,438,145 lb. The total amount of copper produced in the State that year was 29,974,154 lb.

A contract has been let for a new oil-pipe line from the Kern river field to Delano, a distance of 31 miles, the cost to be about $250,000. This pipe will be "rifled," or spiralized, in the interior, to facilitate rapid movement of the heavy oil. By so doing, after some seven revolutions of the oil are accomplished, the oil and water separate, the water forming an outside film, through which the oil passes readily. This is a patented device of John D. Isaacs, of the Maintenance of Way Department of the Southern Pacific.

The Grass Valley, Nevada county, miners' union, is about to start a movement to unionize all mine employees except officials and office help, but there will be no attempt to increase the wage scale. There are about 1,000 miners at work in Grass Valley.

Down at Bodie, in Mono county, the old mill of the New Bodie Mining Co., which was built in 1862, has been overhauled, put in order and started up. It was originally built by English capitalists, and the company finally gave up business. The Syndicate Mining Co. bought the property and let it out to lessees. Recently the Loose Bros. and some Utah men bought the property, and work of opening up the mines was commenced at once. Some 60 or 70 men will soon be employed, 30 being now at work. The mill has been improved, enlarged and put in order, and an aerial tramway is to be built to carry the ores from mine to mill.

In addition to the recent strikes in Amalie district, in Kern county, another district in that county is coming to the front. This is Piute, where high-grade ore is now being shipped to the Selby Smelting Works.

Bisbee. Sept. 24.

Calumet & Pittsburg is sinking a winze from the 910-ft. level at a point where drill-holes that were bored two years ago showed 20% copper, running down from 42 ft. beneath the level floor to the bottom of the drill-holes. This winze should be in ore any day now, for it has been under way a week or more.

Local newspapers have stated that Junction and Pittsburg pumps are now throwing nearly 5,000 gal. per minute, and that the flow is rapidly increasing as depth is gained in Pittsburg and lateral workings are extended in Junction. This is not true. The pumps of the two mines are throwing about 3,100 gal., which is no increase. Of this, Junction handles about 1,000 and Pittsburg the remainder. The latter at one time threw 2,700. The two mines have a magnificent equipment of Prescott pumps; at Pittsburg these consist of two triple-expansion duplex engines, with a capacity of 1,500 gal. each. At Junction there are three 1,000-gal. main pumps, together with four 600-gal. sinkers, all the machines capable of an overduty of at least 25%. Only one of the main pumps of the latter plant is at work. The water problem is not bothering these properties so much as was expected.

In Junction mine they are drifting on the 900- and 1,000-ft. levels. On the upper level the intention is to girdle completely the shaft by a circular drift having a radius of 50 ft., and to run main drifts for mining from this. Much of the circle so far completed is ore, running in places as high as 26%. Some of the finest specimens of malachite and azurite ever seen in Bisbee have been taken out of this drift in the past week. On the 1,000-ft. level they are drifting for a site for an immense pump station, which will be placed on the eastern side of the shaft, close to, perhaps on, Pittsburg ground. In this mine a drift is to start soon for the Hoatson shaft, on the 900-ft. level, a distance of 2,600 ft. This will reach the Hoatson soon after that shaft gets to a corresponding depth. That shaft is going down at the rate of more than 100 ft. per month, and is now nearly 450 ft. deep in a promising formation.

Warren Development & Realty Co. will announce its holdings and to some extent outline its policy in a few days, probably some time in October. It has an area that will prove a surprise to many, and will give some idea of its large plans for the future.

American Development has called $1 on

its capital stock, to be paid half in October and half later. This will make the stock $2 paid, on a par of $10, and it is probable that in due time all will be required. A diamond drill is to be started on the land, to determine its character and if shaft-sinking is desirable.

Tombstone Consolidated will cut down a lift of 200 ft. at once, miners having gone down to begin sinking from the 800 two or three days ago. Water seems to be diminishing slightly for the present, and there is less trouble than for some time. It will be remembered that a 3,000,000-gal. pump has been placed on the 800, and this is handling the water with ease. When the 1,000 is reached, another great pump will be placed and preparations made for opening the mine thoroughly from that level, as it is intended to make that a main-level operation. The company is sinking several other shafts and is mining some ore right along, which is shipped to Douglas and El Paso for treatment. Everything about this property looks well, and it seems as though the undertaking is sure to succeed. The money put into the Tombstone by the present company has been carefully yet liberally spent, and the results are now beginning to show.

About 2,500 tons of Duluth mine ore is in stock at the Calumet & Arizona smelter, waiting the blowing-in of No. 4 furnace. This has all come out of development on the 1,350-ft. level. Stoping begins next week. In Lake Superior there are nearly 2,000 tons of ore stored underground, waiting to be hoisted when the smelter blows in. This also has come out of development alone. This mine commences stoping next week.

Butte. Sept. 26.

An accident to the hoisting machinery of the Diamond mine, an Amalgamated property, occurred yesterday that will reduce the daily output a little more than half for about three weeks. The engine clutches slipped out of place during the absence of the engineer and the cages and cables went into the sump 2,200 ft. down. The arms of the reels were broken. An emergency engine is now raising ore, but can handle only an eighth of the quantity mined under normal conditions. Some ore will be raised through the shaft on the Bell, and the output will be increased at the other mines of the company to make up the deficiency until the large engine is repaired. The daily output of the Diamond is 800 tons.

North Butte has finished 450 ft. of its shaft re-timbering and is mining between 500 and 600 tons of ore per day. The company expects to make more rapid progress in the shaft from now on, as it has crossed the worst section. The vein is holding its own in size and quality. The company is negotiating for the purchase of additional ground.

The shaft on the Original, a Clark property, is nearing 2,000 ft. It will be some time yet before the vein is crosscut at that point, for there is a station to be cut after the work of sinking is finished. The vein on the 1,800 is 18 ft. wide and contains a better quality of ore than that found in the levels above. Sinking is still in progress on the West Steward, also a Clark mine. It will be stopped temporarily at the 1,900. Owing to the shaft work on both of these mines, shipments from them to the Washoe plant have ceased for the time being. The Clark plant is taking all of the ore.

The shaft on the Reins Copper has reached a depth of 880 ft., and is being sunk at the rate of 15 ft. per week. Last week some stringers of copper glance were cut by the shaft. It is the intention not to mine any ore in this property until the work of development now in progress is complete, which will be about the first of the year.

Raven is opening up a body of copper ore at 1,200 ft. It is shipping only that which it is compelled to extract in driving levels. The vein is in Snoozer ground and is strong.

United Copper is operating its mines full blast and has a good future in sight. The output is not sufficient to overstock the smelter. Its Belmont is yielding a little ore, and its Lexington, controlled by La France Co. wing of the main corporation, is still giving up between 40 and 50 tons of copper-zinc-lead ore per day. With the water out this mine will yield a large quantity of ore, for it can be worked from the Cora side.

Salt Lake City. Sept. 29.

The work of installing the aerial tramway by the Bingham-New Haven Mining Co., at Bingham, is nearing completion and will be ready for operation during the first week in October.

It has been announced, semi-officially, that the Boston Consolidated Mining Co. has abandoned the Pelican Point site, in Utah county, for its proposed concentrating mill, and that the plant will be erected at a point near the site of the American Smelting & Refining Co.'s copper smelter, at Garfield.

The Sacramento Mining Co. will forward to Eastern points in a few days a carload of quicksilver.

Several Salt Lake shareholders of the Sheba Gold & Silver Mining Co., operating in Humboldt county, Nev., will contest the validity of the late assessment of 2c. per share on the ground that the directors of the company did not legally hold the meeting at which the levy was made.

On the property of the Utah Copper Co., at Bingham, four diamond drills are working in the monzonite copper zones for exploratory purposes.

Andrew Gebhardt, manager of the Phœnix mine, at Bingham, has been served with a notice from the Bingham Mary Mining Co. management to cease ore extraction from within certain stopes. It is claimed that he has been trespassing in the domain of the Mary Company.

Recent developments in the Skylark mine, in Beaver county, are of a gratifying character. It is stated officially that a 10-ft. vein of copper ore of good grade has been discovered.

Ore shipments will be inaugurated again next week from the Majestic properties, in Beaver county. The ore is to come from the Harrington & Hickory mine. In this property the shaft has been sunk for more than 80 ft. in ore, the lower level showing the vein to have a width of about 12 ft. Samples look well.

Denver. Sept. 29.

The reason of the refusal of Stratton's Independence Co. to renew contracts with the American Smelting & Refining Co., and with the Mill trust, is explained by the purchase of the Dorcas cyanide plant, at Florence, which has been successfully operated for several years, for a sum in the neighborhood of $200,000. As about 5,000 tons of ore are shipped by the lessees every month, undoubtedly a large part of this will be treated at Florence from now on. The company has been considering the erection of a plant of its own for some time past.

At the stockholders' meeting of the Golden Cycle Mining Co., held a couple of days ago in St. Louis, nothing was done in the matter of the construction of a mill, the question being referred to the directors.

There is considerable talk of the erection of a few more reduction plants in the southwestern part of the State, especially in San Juan county, where several have been constructed during the past year.

A good deal of interest is manifested at present in that part of Middle Park, near the new town of Granby, situated on the Denver, Northwestern & Pacific railroad, to the north of which town several hundred claims have lately been staked, in consequence of a large body of oil-shale being found. Within a few days it is expected that a contract for the 16-mile branch road from Granby to Grand Lake will be let, and the company, which is organized under the name of the Rocky Mountain Railroad Co., expects to complete the line by January. It will tap the gilsonite deposits on Willow creek, from which several hundred tons were hauled to this city in wagons some years ago; but the haul was too long at that time to give the deposits commercial value. There is a good deal of talk of a cyanide plant being erected by the Monarch Mining Co., which is operating in that vicinity.

It looks as if the celebrated Hendry

case, where J. B. Hendry sues the Globe Smelting & Refining Co., which now is part of the American Smelting & Refining Co., for $100,000 damages, caused by sulphur fumes, will be re-tried next month, as notice to docket the trial has been given in the district court. The case was tried about a year ago, when the jury disagreed.

With a constant inflow of gold of about three millions per month, there is at present about twenty millions in gold bars stored at our new mint, where coining operations are expected to commence soon.

Leadville. Sept. 29.

After 15 years of litigation, with the mine closed, the Long & Derry property, situated on the hill of the same name, will resume active operations within a few weeks. The litigation has been settled and Charles Taylor, of Chicago, has secured an option on the property and will start work. He has also secured options on ground adjacent to the Long & Derry and with the two has an area of 100 acres. He has formed two companies, with plenty of capital, to thoroughly develop the territory. Previous to the closing down of the Long & Derry, the mine produced over half a million dollars, and it is claimed by miners who worked in the mine that there is plenty of ore left in the old workings.

A strike was recently made in the Lucy Fulford camp, Eagle county, which has created a little excitement in that section. The vein is 35 in. wide and is a brown honeycombed quartz carrying free gold; assays from the vein show high values. A tunnel has been driven on the vein 135 ft. and the new orebody was caught at the breast. On the Roaring Fork side of the range, prospectors are out looking for the extension of the Lucy. At the base of Fool's peak the Lakeview has started up after being idle for a year. The shaft is now down 175 ft. and will be sunk another 325 ft. The vein is of good size, carrying low-grade gold values from $12 to $14 per ton and the owners will put in a stamp mill to treat it.

An upraise is at present being sent up to connect the lower level with the one above in El Paso, and when completed the mine will be able to produce in the neighborhood of 150 tons daily. From the lower level the mine is at present sending out about 75 tons daily. Leases have recently been let by the Little Pittsburg Co. on the Bullion claim and 250 tons a month of excellent iron is being shipped. Below No. 7 shaft one of the lessees is sinking a new shaft and expects to reach the iron in a few weeks.

Since the beginning of the year the Small Hopes people have been shipping the Kerns dump, averaging 75 tons daily; the work was completed last week. Work is now being done underground at the 250-ft. level and ore is being hoisted. From the other shafts owned by this company the daily output will reach 250 tons.

The Ollie Reed, South Evans, is shipping a fair tonnage daily from No. 2 shaft, and at No. 1 shaft prospecting with the diamond drill has been going on for some time; now the company has decided to sink the shaft deeper, so it is fair to presume that the orebodies in the lower strata were caught by the drill.

With the opening up of the Continental Chief, at the head of Iowa gulch, with steady shipments going out, and the recent good strike made in the Beekman claim, the attention of capital has been drawn to this section. St. Louis and Denver capital has secured a lease and bond on 100 acres lying south of the Continental Chief. A tunnel will be driven a distance of 500 ft. to open up the veins; an air-compressor and surface plant have been ordered and should be on the ground by the end of the month. A telephone line has been put into the Continental Chief a distance of seven miles.

With the demand by the smelters for iron, a revival of mining has taken place on Carbonate hill, and the ground belonging to the Evening and Morning Star companies is being worked extensively by a large number of lessees, and all are making good money. From the different claims about 400 tons daily are being shipped. In the Crescent No. 2, at the lower level, a body of ore was opened that runs high in silver and carries a fair percentage of lead.

After prospecting for a number of months in the lower levels of the Evelyn, Graham Park, a good body of ore was opened during the week. The ore is dipping down, and as the shaft is 1,200 ft. deep it will be easy to catch the ore below. The ore is a sulphide, and it is supposed that it is one of the many shoots that trend from Carbonate hill through the park.

The Adelaide park section is getting busy, and this week sees the resumption of work on the old Park lode. After the necessary cleaning up is done, breaking ore will commence.

Duluth. Sept. 22.

G. H. Crosby, who is at present the most active explorer in the new Deerwood or Cuyuna range, west of this city, states the present situation with reference to his work as follows: "We have found a lot of ore, have got it to an average depth of 100 ft. over an area that may be much more than 2,000 ft. long, but so far it is not worth anything. That is the situation precisely, it is worth nothing at all. In my first hole there were 30 ft. that looked very well, and we were much encouraged. Since then the five drills I have at work have cut ore too low grade to be considered, except that the last hole, lying near the western line of my property, is looking better. I have been told that the Cuyler Adams work, just west of me, is even better and that it looks more encouraging. It would seem that where there is so much lean ore as we have found there must somewhere be good ore, and that with many millions of tons of such stuff as we have, we may have reason to expect soon to get into something that will be fit to mine. I am sure that nothing under 56% iron can at present be called merchantable iron ore, and then only when it is fairly good in other respects. Some of the Deerwood ore is fairly good in other respects and some is not. The region will not be one of cheap mining. It is deep to the ore and must be operated underground, the ore is hard and the country is very wet. Most of the ore carries manganese and phosphorus, though I am told that the Northern Pacific road, in drilling on some of the Adams lands in section 3-45-29, is getting an ore that is not mixed. All of the range carries about 0.3 to 0.5 phosphorus."

Mr. Crosby is the leading explorer on the range, in that he has more drills running than anyone else; five are at work on his lands. A previous statement that 30 drills were there was based on the expectation that six would be added to the number then at work, before the close of the week, but these have not been put in, and there are now just 23. Mr. Adams, who is working just west of Crosby, near Rabbit lake, is said to have 3,000,000 tons of ore there, some of it fairly good. He has ceased nearly all work for the present on his large acreage of lands on the south range, on a direct line between Deerwood and Brainerd, where he found some ore, but some of his lands are being explored by the Northern Pacific road and Pickands, Mather & Co. He claims that both these concerns are getting merchantable ore. He expects to return to this part of the range and continue his own explorations in a short time. Unless Mr. Crosby finds better ore shortly he will probably cease work altogether.

The Minnesota courts have handed down a decision in the case of the State vs. Mabel Evans, owner of a mining lease on the Mesabi range, in which the State sought to recover the land, setting up the plea that the tract was obtained fraudulently. Later, in order to strengthen its case, the State further alleged that all mining leases were in violation of the provision of the Constitution which requires that all land sales shall be by public auction. This was the important contention in the case, and if the State had won it would have confiscated many millions worth of property and improvements along the Mesabi. But the court rules against the State on every point, declaring that the land in question was secured legitimately, and that the statute under which mineral lands are

leased is constitutional. The action will probably be carried to the Supreme court, in order that it may be settled conclusively and for all time.

The Duluth, Missabe & Northern road, which last month shipped more than 1,400,000 gross tons of ore, is now so far behind that it is almost impossible for it to reach 1,000,000 for September. The Duluth & Iron Range and other Minnesota roads are in almost the same condition, though not so seriously behind. This is the result of weather conditions at mines, which have been bad all year but have of late culminated in such a succession of storms that the mining companies were forced to slack up.

The project of electrical haulage of trains on the Duluth, Missabe & Northern road from the docks to the road yards at Proctor, six miles away, is under consideration by the leading electrical companies of the country, both of whom have had men in the field here recently. The same companies are gathering data for the possible substitution of electricity for steam in the mines of northern Minnesota, with the view of utilizing the power to be supplied next year by the Great Northern Power Co., of Duluth. The Proctor plan is especially favorable, as the road brings its ore trains from the mines to that point, where they are turned over to heavy switch engines and forwarded to docks as occasion requires. Proctor is the terminal yard, and the docks are a few miles beyond, down a 2% grade. If the plan works out and is successful in application, there is little doubt that it will be extended ultimately to the main line of road and to the other iron-ore carrying lines of the district.

The Oliver Iron Mining Co. is recommending to the governing committee of the United States Steel Corporation the expenditure of considerably more than $1,000,000 for additional equipment and betterment for the coming year. It is not supposed that authority to make purchases will be given for some weeks to come. The Oliver Company is extending its plan of carrying forward its own stripping work, and will require a number of additional locomotives and steam shovels for the purpose. In the list of equipment are no less than 65 large standard-gauge locomotives and from 25 to 30 steam-shovels of large power. There will also be a great many stripping cars and similar equipment. Nearly all of this will be for the Mesabi range, and a large portion of both shovels and engines for the Hibbing district. The Oliver Company's order for shovels given about a year ago, was the largest that had ever been placed for any private concern, perhaps the largest for any one, but it will be far exceeded in present requirements. For the new western Mesabi district, where the mines of the former Canisteo Company are being opened, and where the company is doing a large amount of exploratory work, about $215,000 will be needed at once for mine buildings, shafts and power. The Duluth, Missabe & Northern road is now being extended to this part of the range, and, though the season has been very bad, it is apparent that the work will be completed by the opening of navigation.

Calumet. Sept. 30.

One of the most remarkable features of the present situation in the Lake Superior copper district is the large amount of exploratory and development work that is in progress. On all portions of the copper range diamond drills are in commission, and exploratory openings are being made. Nor is the present activity confined to the new mines, as many of the older and larger companies are investigating undeveloped portions of their properties. The discovery of important values on some of the older properties is practically certain, and these companies will have a big advantage in their complete mining and milling equipments, whereas the newer properties are not provided with extensive plants.

As illustrating the advantage possessed by the older companies, the Calumet & Hecla will serve as an example. It is developing two new mines on the main portion of its property. These are on the Osceola and Kearsarge amygdaloid beds, lying to the east of and paralleling the main mine on the Calumet conglomerate. While the openings on the Osceola lode were created a few years ago, and operations were suspended for some time, the present work is largly of a development character, and the size and value of the mine is increasing. Not only is the value of the property being proven, but the new workings are contributing to the production of the company, and the cost of the new work is probably more than paid for from current production. Another mine, which is not nearly so far advanced, is being opened by the Calumet & Hecla on the Kearsarge, and these openings also pay much of their cost by their copper output.

With the newer companies, such as the Tecumseh, Superior, Winona or Rhode Island, while their exploratory work is increasing their prospects and value their new workings cannot be made a source of immediate profit, and they do not reap the full benefit of the present copper market. The Atlantic, in opening its mile-square tract on the Baltic bed, is not at this disadvantage. Neither is the Franklin, which is exploring for the southerly extension of the Kearsarge amygdaloid on its Franklin Junior property.

Centennial's operations are now reaching a highly interesting stage. It is believed that the lower workings are just beginning to enter the rich copper shoot which dips out of the Wolverine into its ground. The character of the Centennial's new workings would indicate this; at least there is a decided improvement noted in the quality of the lode. The Centennial mill returns show steady improvement. In August the mill was in commission 14 days on Centennial rock, stamping 7,400 tons. The product was 128 tons of mineral, an average yield of 1.73%, or 34½ lb. to the ton stamped. Of the rock hoisted only 11% was discarded and this is indicative of the character of the openings.

Earnings of the Centennial Co. last month were more than sufficient to pay expenses, something that was never before accomplished in any period of its history. It is believed that the openings underground will improve steadily as depth increases, and there should be a constant increase in production. Few people realize the possibilities of the Centennial. Its immense territory on the Kearsarge bed gives it a great advantage over some of the mines on this famous formation. Both the Wolverine and the South Kearsarge, which is the richest portion of the Osceola Consolidated, are cut off at depth by the Centennial. That the rich copper-bearing ground being wrought in those two mines should stop abruptly at the Centennial's line, is not reasonable, and it is only a matter of time when the Centennial will penetrate the rich ground dipping out of those properties into its land.

Few of the smaller producers in the lake district have benefited more largely from the advance in the price of copper than the Mass Consolidated, of Ontonagon county. During the last two years the attention of the management has been devoted mainly to the development of the property and the opening of greater areas of stoping territory. Now the mine has a large reserve blocked out and is in a position to take advantage of the strong demand for copper. Rock shipments have been increased to 520 tons daily and current production is at the rate of 3,150,000 lb. of refined copper annually.

Platteville, Wis. Sept. 30.

The Hazel Green camp bids fair to be one of the best producers in the whole district. The Hoskins property continues to produce its usual output, which brings top price, owing to the fact that it is equipped with a magnetic separating plant. Some time ago a "per-ton" basis was introduced by Mr. Root, whereby the shovelers were to receive so much for each tub loaded; formerly it was difficult to secure enough mill dirt to keep the plant running steadily, but since the per-ton basis was introduced no trouble has been experienced.

Adjoining the Hoskins is the Kennedy mine, who have just installed a magnetic separating plant. In addition to the new separator the owners gave the concen-

trating plant a thorough overhauling and installed an Overstrom table. They have some 500 acres under lease and in fee, with the ground opened up. Messrs. Phil Allen and Spensley, of Mineral Point, are among the principal owners.

Messrs. Smith & Newman, of Madison, Wis., who are heavily interested throughout the district, have been pushing their development work at Hazel Green camp, in order to be in a position to carry on their work during the winter. It is their intention to have adequate machinery installed at once for hoisting and pumping. They also intend to instal power drills.

A new strike is reported at the Hazel Green mine; an entirely new range has been opened up, which parallels the one they are now working on. In order to secure a better price for the ore they have installed a Galena pattern roaster and a Cleveland-Knowles magnetic separating plant, which will be completed within two weeks. The mine is owned by local parties principally.

The reorganization of the Capitola mine has been perfected. A majority of the old stockholders remained in the new company. They will operate under the name of the Watts Mining Company.

The Empire Mining Co. declared another dividend at the regular meeting, Friday night. This makes the third dividend during the month of September.

The Coker mine, located about 3⅓ miles from the Rewey camp, has been one of the steadiest producers in the district. It was at this place that the first modern concentrating plant was erected in the Wisconsin district more than three years ago. It has recently fallen into the hands of the New Jersey Zinc Co., which has made several additions in the way of improved machinery. The company is at the present writing installing a large Ingersoll compressor. During the summer several hundred feet of diamond core drilling was done, and it is reported that some important orebodies were located. The management of the mine is under the charge of W. A. Jones, of Mineral Point, Wis.

Toronto. Sept. 30.

A general revision of the mining laws has been positively decided on by the Ontario government. A comprehensive bill embodying the desired changes will be submitted at the next session of the Legislature. In order to make the measure acceptable to the class more immediately concerned, the Government is anxious to obtain the opinion of mining men as to what changes should be effected. The latter are accordingly being asked by the Crown Lands agents in the mining districts to hold public meetings for the discussion of the question and to put their views on record, and the further suggestion is made that the miners and prospectors of each locality should elect delegates to a general convention at which the whole matter can be thoroughly threshed out, and a consensus of opinion obtained. District meetings are likely to be held shortly at Kingston, Madoc, Haileybury, Sudbury, Sault Ste. Marie, Port Arthur, Kenoia (Rat Portage) and Fort Frances. The general convention will probably be called to meet in Toronto.

The necessity for the early establishment of a local refining plant for silver-cobalt ores is illustrated by the experience of the Temiskaming & Hudson Bay Mining Co., as detailed at their annual meeting held in New Liskeard, Sept. 25. The company, nearly all of the stock of which is held in New Liskeard, owns the only one of the producing mines of Cobalt that is not held either by private individuals or close corporations. It began on a working capital of about $8,000 and in June last the vein on the claim, adjoining the town site of Cobalt, was discovered, which it has since been working with a small force of men and without machinery. President George Taylor stated that two cars of ore had been shipped to New York, on which they expected to realize $60,000. They had two offers—one from Mr. Earle, representative of the Nickel Trust, who said he would give 90% of the silver value of the ore and alow 10c. per lb. for the nickel and 60c. per lb. for the cobalt. Before it was accepted, this offer was withdrawn, though it was intimated that it might be renewed. The American Smelting and Refining Co. offered 95% of the silver, but would allow nothing for the other metals. The asasy of Ledoux & Co. which was the basis of the deal was as follows: Silver, 2,008 oz. per ton; cobalt, 8.98%; nickel, 9.21%; arsenic, 39.43%. Under the circumstances it was considered advisable to accept the American Smelting and Refining Co.'s offer, under which the shippers receive no allowance for 4,310 lb. of cobalt, 4.420 lb. of nickel and 18,926 lb. of arsenic contained in the 24 tons of ore. . The incident emphasizes the importance of the smelter question. Mr. Taylor announced that the Cobalt mine owners were now considering a proposition to erect a smelter for the camp and that steps were being taken to form a company for the purpose, with a capital of $1,000,000, the stock to be taken up by the mine owners. The sale of the ore in New York will enable the Temiskaming & Hudson Bay Co. to instal machinery and make explorations for new veins, in addition to paying a dividend. The original capital of the company was $25,900 in shares of $1 each, but only 7,640 shares were sold and the rest of the stock is in the treasury and will not be sold. The stock is now quoted at from $55 to $70 per share.

Mining has been fairly active in the North Hastings region in eastern Ontario. The installation of a stamp mill of improved construction, and double the former capacity, at the Craig gold mine, Tudor township, has resulted satisfactorily and the mine is being steadily worked. Lead mining has been recommenced at the Katherine mine, near Millbridge, in the same township. The output of this and the Hollandia mine in the vicinity will be treated at a new smelter now in course of erection at Bannockburn. The Moore iron and copper mine, Eldorado, is in operation under the management of A. W. Coe. A new compressor has been put in. Owing to flooding in excess of the present pumping capacity work at the Bannockburn gold mine has been temporarily discontinued. Stephen Wellington is mining talc at Moira lake, and making considerable shipments of fluorite from his property near Madoc.

Eugene Coste, mining engineer, of Toronto, is inspecting the Marks-Wiley hematite ore deposit in the Loon lake district, near Port Arthur, for the purchase of which the Mackenzie & Mann Co. is negotiating. He is acting on behalf of the prospective purchasers, who are desirous of securing ample sources of supply for the smelting industry to be established at Port Arthur.

The Hart Corundum Wheel Co. and the Canadian Corundum Co., both of Hamilton, Ont., have amalgamated under the title of the Canadian Hart Corundum Wheel Co., Ltd., with a capital stock of $75,000. The incorporators of the new company are Charles D. Warren, C. S. Wilcox, George F. Webb and H. E. Sherk, directors; Andrew S. Devine and F. H. Whitton.

The Northern Exploration Co., Ltd., has been incorporated with head office at Haileybury, and a capital of $100,000, the provisional directors being Frank M. Perry, Stair D. Lauder and Arthur C. Boyce.

Victoria, B. C. Sept. 18.

Coast.—The first bulk shipment of ore from the Britannia mine, Howe Sound, reached the Britannia Smelting Co.'s smelter at Crofton, Vancouver Island, Sept. 15. The shipment consisted of 520 tons of crude ore and 90 tons of concentrate. Thomas Kiddie, the newly appointed manager, has taken charge at the works, and is getting things in shape for blowing in the furnaces six or eight weeks hence, by which time there will be a large supply of ore in the smelter bunkers.

At Ladysmith, Sept. 15, Thomas Kiddie was presented with an illuminated address by the Ladysmith Board of Trade, and a gold watch by the employees at the Tyee Copper Co.'s smelter, on the occasion of his leaving Ladysmith, after having been in charge of the local smelting works since they were erected, and an active member of the local Board of Trade for about four years. While at Ladysmith Mr. Kiddie made several important improvements at the smelter, notably in connection with the making into bricks,

for roasting, of the ore fines; the expeditious delivery of ore from the bunkers to the roast heaps, and the invention of a simple but effective and economical hot-blast system, which he has patented.

The discovery of an extensive belt of country containing silver-lead ores of high grade and situated in the vicinity of Maple Bay, Portland Canal, is reported from Skagway. This mineral zone is described as being all in Canadian territory. Numbers of prospectors from Ketchikan and other northern points within easy reach are proceeding to the new camp. Samples of ore having a rich appearance have been sent to Port Simpson, but no assays had been made up to the latest advices. Another find of silver-lead ore has also been reported—this time on Douglas Channel, not far from Hartley Bay.

Miners from the Omineca district are on their way down Skeena river, bringing with them the season's clean-up from several placer properties that have been been worked in that district. The party embraces some 50 hydraulic and ordinary placer miners, who will winter in a less rigorous climate than that of the isolated northern placer country.

Similkameen.—It is reported that a big body of ore has been discovered at the head of Bear creek, on the divide between the Tulameen and Coldwater rivers. The surface showing of this orebody is described as being as big as that of the Granby mines, in the Boundary district. It occurs at a contact of granite and porphyry. Chalcocite and chalcopyrite are stated to be disseminated freely through the ore, and it is estimated that it will run 2% copper, besides gold and silver values. The Great Northern Railway Co.'s line, for which a route through the mountains, after leaving the Similkameen valley, is now being sought by engineers, will, when constructed, afford transportation facilities for the locality in which the new find is situated, as connection with the main line, by means of a short branch line, will be quite practicable.

Boundary.—The total area of mineral claims now owned by the Granby Consolidated Mining, Smelting & Power Co., Ltd., is stated by the Phœnix *Pioneer* to be nearly 700 acres, of which about one-half has been acquired during the last year or so. The company's original group consisted of 12 claims, to which have been added 13 claims, as follows: Monte group of four claims, $15,000; Monarch and Tamarack group of four claims, $180,000; Gold Drop group of four claims, $225,000; No. 13 claim, $12,000; total cost, $432,000. The *Pioneer,* which is usually well informed relative to the Granby Company's mining and smelting operations, states further that the ore showing on the new group is much the same as on the old group, from which nearly 2,000,000 tons of ore have been shipped since production was commenced in the summer of 1900. The Monarch and Tamarack have been prospected largely by means of the diamond drill, and now quarries are being opened in ore on these claims. The Gold Drop has been developed by tunnels and raises, so that shipment of ore from these workings will be practicable so soon as connections are made with one or both of the railways passing near by. The Gold Drop lies between the Granby old group and the Snowshoe. The workings of the latter, from which some 94,000 tons of ore were shipped in 1901-1903, are within a stone's throw of the Gold Drop surface works.

Mexico. Sept. 21.

It has been learned as a positive fact, on the best of authority, that the deal between the American Smelting & Refining Co. and the Torreon Metallurgical Co., for the sale by the latter to the former of the Torreon smelter, is temporarily, if not permanently, off. The undetailed facts are that the Trust offered $4,200,000, Mexican, for the Torreon plant, but the Torreon Company asked $5,000,000. The Smelting Company then had several of its leading officials, among them Mr. Anton Eilers, examine the plant, and finally raised the offer to $4,500,000, Mexican, but Mr. Ernesto Madero, president of the Torreon Company, acting for the directors and stockholders, absolutely refused to consider the figures, practically calling the deal off, and Mr. W. S. Morse, general manager of the Southern department (El Paso and Mexico) of the American Smelting & Refining Co., left suddenly for New York, for medical treatment, he said. In the meantime other New York interests, which are not new to the smelting business, have seen Mr. Madero, made an examination of the property and business, and it is not improbable that the deal may be consummated between them. This may also strengthen the Torreon people in their independence. But their greatest strength lies in the several new lead mines which they have recently obtained, so that they are no longer at the mercy of the Trust for these ores. They were not in this position last November, when the Trust first made overtures, and had matters been pushed at that time the results might have been very different. Up to the present, though, Torreon is independent.

What is being done at Angangueo, Michoacan, with the old smelters there, cannot be positively learned, but it is known that Mr. F. N. Flynn was called by Mexico City capital from Salt Lake City, Utah, over two months ago, to examine thoroughly into the proposition and report as to the advisability of starting a matting plant there on the site of the old smelter, or building anew at some more favorable point for handling the ores of that section. It is believed that Mr. M. Elsasser, of Mexico City, is the leading spirit in this move, and that Mr. Flynn will be in charge if the proposition is carried through.

It is understood that the old smelter at Chalchihuites, in the State of Zacatecas, which 10 years ago was run very successfully by Cia. Beneficiadora de Metales de Chalchihuites, but was closed because of financial troubles of the company's president, Aurelio Bueno, of Mexico City, is to be started up and enlarged by the Zacatecas & Durango Mining & Smelting Co., made up of Los Angeles capital. This will be a great boon to this worthy district, which has suffered because of its distance (100 miles) from the railroad; this long haul has at last forced the Sombrerete mines of the Mexican Metallurgical Co., near Chalchihuites, to close down.

Negotiations are said to be pending for the sale to New York capitalists, of the San Cayetano mine, about six miles north of Guanajuato, and belonging to the United Mexico Mines Association, Ltd., of London. If the sale is consummated it will be the closing up of the business of this old company, as it is the last of its holdings. Organized in 1814 it has leased the Rayas and Jesus Maria, and owned the Cata, Cubo and San Cayetano, from all of which it has had excellent returns. The first on the field, with the best of opportunities, it has for some unknown reason allowed the properties to go. Cubo is being worked by Chicago people, the Cata by the Guanajuato Reduction & Mines Co., and now the San Cayetano is to go, and the old company pass out of existence.

London. Sept. 23.

In a recent letter I gave some details of the present position of the Esperanza mine in Mexico, the shares of which are extensively held in this country. The new strike then referred to appears to be turning out a bonanza. As a rule, bonanzas do not get into the hands of the public, and I have no doubt that the original owners regret that they parted with their property. On August 30 the smelting ore blocked out amounted to over 60,000 tons, and the estimated net profit is no less than $5,000,000, while other ore is described as "probable," to the extent of $2,500,000 profit. This little windfall for British shareholders will go a long way to cheer up the mining market here.

The information nowadays given by mining engineers and directors of mines is eminently fair and above board. In this particular case the directors specifically advise shareholders not to take these extra profits as dividends, but to reckon 10% as dividend and place anything over that as amortization of capital. This is excellent advice. It is not necessary to go back to old days to present a contrast between the doings of this company and other historical parallels. The shareholders in the Esperanza Co. have the double advantage firstly of acquiring a mine before the owners had scooped out the rich

ore, and, secondly, of having directors who tell the whole story and give sound financial advice.

Great interest is taken in England in the new departure of the Mount Lyell Co. in acquiring tin properties. For some time the rapid impoverishment of the Mount Lyell copper deposits has been well known, and even the recent consolidation with the North Mount Lyell was known to be a comparatively temporary makeshift. The directors had come to a decision a long time ago that their unrivaled metallurgical organization should not be allowed to die with the Lyell copper deposits, and had been actively seeking for new fields for their enterprise. The tin deposits in question are in the Blue Tier district, where two companies are already working. One of these is the Anchor Tin mine, an English company, to which I have frequently referred in these columns. The tin ore is of extremely low grade, but if worked on a large scale, and by competent mining men, such as are identified with the Mount Lyell Co., there is every prospect of successful treatment.

The London mining market is this week chiefly occupied in discussing E. H. Garthwaite's report on the Rhodesian banket deposits. It will be remembered by your readers that some time ago a gold-bearing deposit somewhat similar to the Rand deposits was discovered in the Lomagundi district in Mashonaland. At the time, for market purposes, a great deal of noise was made about the discovery, and flamboyant reports were circulated. A few weeks ago, the report of the engineer of the Rhodesian Banket Co., H. D. Griffiths, was issued, and this week the report of the engineer of the British South Africa Co., E. H. Garthwaite, has been published. The mining market and the public generally have apparently taken a wrong idea of these two reports, having looked upon Mr. Griffiths as too optimistic and Mr. Garthwaite as throwing a damper on Mr. Griffiths' enthusiasm. On careful reading of the reports there is no discrepancy between them. Mr. Griffiths' is certainly more optimistic than Mr. Garthwaite's, but the difference between their views is due solely to "personal equation." It is true that Mr. Garthwaite gives a note of warning against too sanguine hopes, but his warning is uttered against the doings of the market operators and is not in any way an expression of acute difference in opinion with Mr. Griffiths.

In Mr. Garthwaite's and Mr. Griffiths' reports the first exact information is given as to the nature of the deposit. The formation is characterized by schists of various classes, chiefly hornblendic micaceous and chloritic. In these schists there lie pebbles and boulders of granite, quartz, quartzite and banded ironstone forming a conglomerate. As there are several bands of conglomerate, and as the pebbles are of such variety, the opinion is that it is a sedimentary deposit and not caused by shearing and crushing. The most noteworthy feature from the miner's point of view is that the gold contents vary in most erratic fashion, ranging from 1 dwt. to many ounces. The gold occurs in very thin seams, sometimes being found on the footwall and then suddenly jumping to the hanging wall. The amount of useless development work is consequently considerable. So that what with the elusiveness of the pay-streak and the irregularity of its contents, the value of the deposit is open to some question. Mr. Garthwaite says that sufficient work has not been done to prove the value of the mine and will not commit himself further than to say that with the limited amount of work done the results so far obtained are satisfactory and that the 32,000 tons of 16-dwt. ore now developed form a splendid start for the property. Finally, he won't specifically predict the future of the mine, but regards it as a promising prospect. So far, therefore, as the discoveries have gone at present, there is no evidence of the Rhodesian banket being a second Rand.

Scranton. Sept. 30.

An invention has been made by Fred Nichtel, one of the mining engineers of the Lackawanna, whereby he claims that the necessity for the washery will almost be eliminated, and that the breakers of the future will prepare and assort the smaller sizes. The new Diamond breaker of the company, now being built, will be equipped with Mr. Nichtel's invention, and until a thorough test is made he is reluctant to give out the details. Mr. Nichtel has patents on the new spiral pickers which are in use in the great Truesdale breaker, the largest in the anthracite region. The new Truesdale breaker will begin operations in the course of a few days, having been officially inspected by Vice-President E. E. Loomis, and other officers of the company last week.

There is more talk of a strike in the papers outside the anthracite region than is heard among the mine workers and their leaders. It is generally believed among the operators and the mine workers that there will be no strike in April next. The mine workers do not want a strike. Their leaders are by no means anxious for one, and the operators would prefer that the peaceful conditions be not disturbed. None of the parties is spoiling for a fight. It is significant that just previous to the last two strikes John Mitchell visited the anthracite region, for the purpose of stirring up the organization, and recruiting the members. In 1900 he had about 8,000 members when he called out the 150,000 workers on strike. In 1902 the membership had dwindled materially, and the revenue of the organization had diminished perceptibly; the strike talk was very largely on the part of the loyal members who were paying their dues regularly, as against those who were delinquent. Not even John Mitchell expected a prolonged fight, but it soon got beyond his control, and the result was the appointment of the Roosevelt commission. This year things are very different. The miners are more contented and their grievances are more against those who have left the union, rather than against the operators. Should a strike be called it will largely be for the purpose of forcing back into the union the large body of men who have been so indifferent for the past two years. The union has to maintain a large staff of organizers, and it is imperative that the revenue be maintained. There are many in good standing who contend that the management is extravagant and that the number of officers should be reduced. This sentiment was brought to a head at the recent convention of District No. 1, in Dunmore, when one of the delegates, a prominent labor leader, George Watkins, former president of the Scranton Central Labor Union, submitted a resolution calling for a reduction in the number of organizers in receipt of a regular salary. The motion, of course, was defeated. It shows, however, the dissatisfaction which exists. If therefore the strike feeling should preponderate so far as to call a strike for the purpose of forcing the malcontents back into the union, there is a danger that the organization would have to fight the malcontents as well as the operators. The leaders are fully alive to these conditions, and as April, 1906, approaches the chances of a strike will decrease. With a substantial increase in the membership as reported by Mitchell, it can be safely stated that the leaders will be satisfied. Had there not been a response to Mitchell's appeal, the status of affairs would have been different.

Many complications are threatened in the anthracite region when the new child labor law goes into operation on Oct. 15. It was passed at the last session of the legislature at the instance of the United Mine Workers and provides that no child under the age of 14 years shall be employed in the breakers, and no child under the age of 16 years in the mines. It is a measure for the anthracite mines only. The old law restricted the ages to 12 for employment in the breakers and 14 years for employment in the mines. The new law will, therefore, have the effect of cleaning out of the mines and breakers the thousands of boys now employed who are under 14 years of age. There is one section of the act which will entail some hardship on the operator, as well as the boys and their parents. It provides that no minor child shall be employed in or around the mines until he shall have filed with the superintendent of schools an affidavit as to his age verified by a birth or baptismal certificate, and shall have re-

ceived from the superintendent an employment certificate stating that he can read, write and spell the English language and that he is familiar with the operations of arithmetic to and including fractions. It is a conservative estimate that 80% of the breaker boys have absolutely no idea of fractions, and that their education is of the most crude nature imaginable. This can be better understood when it is explained that more than one-half of the breaker boys are the children of foreign-born parents, and it is against these, principally, that the efforts of the Mine Workers were aimed in seeking the passage of this drastic law. The school superintendents throughout the anthracite region are considerably exercised over the question. It will involve an enormous amount of work upon them and that of a very responsible nature. They will be compelled to carry out their work faithfully, as they will be closely watched by the Mine Workers, who are determined that the act shall be honestly and literally administered. It is difficult to predict the effect. Many breakers will be crippled and thousands of boys will be thrown out of employment. Already there is talk of having the act repealed or amended.

Judge Bechtel, of Schuylkill county, has granted a preliminary injunction restraining a number of coal companies from washing coal dirt into the Mahanoy creek, it being alleged that it blocked the sewer outlets in Girardville. It threatens to be one of the most important suits begun in that county for some years.

At last there is a prospect that the Miners' Home will become a reality. After some years of inactivity, the commission appointed by Governor Pennypacker has held a session and commenced the work of formulating plans for establishing the home. It is proposed that the operators shall contribute one mill upon each ton of coal sent to market, and that the miners shall pay an assessment of 60c. each per annum. Any miner who has worked in and around the mines for 25 years, and has reached the age of 60 years, shall be eligible for admission to the home. Any miner who has been injured while following his employment shall also be qualified for admission, as well as the wives of miners who have reached the age of 55 years. It is not planned that any contributions shall come from the State funds, but that the institution shall be supported by the operators and the miners. The bill authorizing the building and organization of the home will be introduced in the session of 1907. The miners will be asked through their district presidents to agree to pay the annual assessment, and payments by both operators and miners are to be made quarterly to the State treasurer, commencing on January 1, 1906. The arrangement will apply to the bituminous as well as the anthracite region.

General Mining News.

CALIFORNIA.

AMADOR COUNTY.

Jose Gulch Mining Co.—Work has been resumed on this mine near Butte City, W. E. Stewart, superintendent. A 700-ft. tunnel is being driven in from the mill.

Gowanus.—A new company is about to re-open this old mine near Plymouth. It is now owned by Colonel Brown.

South Eureka.—A powerful electric pump is being put in this mine under agreement with the Central Eureka mine. In a winze in the floor of the 2,400 level an 8-ft. body of ore, assaying $15 per ton has been encountered.

MARIPOSA COUNTY.

Dexter Mine.—This mine, six miles from Coulterville, has been bonded by W. Graham, of Los Angeles, and is being unwatered under superintendence of Harry Argall.

Omparisa.—At this mine (formerly the Mountain King) a 10-stamp mill is being put up.

Crown Lead.—The five claims comprising this property, three miles from Coulterville, are being examined by San Francisco men, with a view of re-opening. The mines have not been worked for over thirty years.

Teats.—At this mine, Whitlock, good ore is being taken out and the mill will shortly be in operation.

NEVADA COUNTY.

Curry.—On the quartz claim of John Curry, west of Nevada City, a 12-ft. vein of $8 rock has been struck at the end of the 100-ft. tunnel. The claim has been worked on a "pocket" basis for a number of years.

Copper.—The copper property at Iron mountain, near Spenceville, has been bonded by John Hays Hammond. Prospecting operations have been carried on during the past few months. It is now announced that a shaft will be sunk as a better means of proving whether or not the claim is as valuable as supposed.

Union.—In this mine, near Nevada City, a small, but rich ledge has been uncovered on the 200 level, 135 ft. north of the shaft. The unwatering of the second level was recently completed.

SHASTA COUNTY.

Redding Gold & Copper Mining Co.—This company is putting a cement dam across Clear creek, a mile above the Redding and Igo bridge, to develop power for electric motors. The dam will give 70 ft. fall. The company is planning to erect a smelter at Muletown.

Dobrowsky.—This mine, near Shasta, is being developed under bond by H. O. Cummins and associates. The five-stamp mill has been started up with the new electric power plant. Three shifts of men are now at work.

SAN LUIS OBISPO COUNTY.

El Chorro.—This property has been leased to a new company, which will develop it at once, and put in a cyanide plant.

Western Mining & Steel Corporation.—This company is about to prospect with a diamond drill on several ranches on Los Osos creek, in search of copper and iron deposits believed to exist there.

SIERRA COUNTY.

Nobby.—This claim, near Pike City, is to be opened by Geo. W. Mohler, of Stockton, Cal. A bedrock tunnel is to be started.

SISKIYOU COUNTY.

Eliza.—This old mine on the north fork of Humbug creek is being developed under superintendence of C. A. Patterson, who has 17 men at work.

Gold Dike.—At this property on the south fork of Salmon river, a cyanide plant is to be installed.

Ohm & Hahn.—This property, on Cherry creek, has been bought by F. W. Mahler. The tunnel is to be driven 250 ft. further. The property consists of nine claims and a water right.

Hegler.—At this mine, on Humbug creek, H. F. Ohm is putting up a cyanide plant to treat the tailings which have accumulated.

TUOLUMNE COUNTY.

Clio Mining Co.—The shutting down of the water and electric companies' works has brought about a partial stoppage of work at this mine.

Santa Ysabel Mining Co.—During the development work at this mine a shoot of ore has been uncovered, but the mill will not be started until more water is available.

Harvard Mining Co.—The company's holdings have been sold and will now be in the hands of men able to put up sufficient money to fully develop the property.

Doyle.—This mine, being full of water, the owners are unable to resume operations. A larger pumping plant is to be installed.

TRINITY COUNTY.

Dredge.—The dredge on Trinity river, near Trinity Center, G. W. Payne, superintendent, is making returns satisfactory to the owners.

COLORADO.

GILPIN COUNTY.

Hattie Myrtle.—Denver parties have concluded a sale of this group in Pleasant Valley district to Chicago people, who will instal machinery and arrange for heavier

developments. M. A. Wright, Central City, is manager.

Saratoga Development Co.—This company has been organized with capital stock of $100,000 and with the following officers: President and general manager, John Owen, Idaho Springs; F. A. Whitefield, New York, vice-president; H. T. Rogers, New York, secretary and treasurer. The New York parties have purchased a half interest in a lease and bond on the property from Charles Morgan, of Idaho Springs, and it is reported will at once commence the work of unwatering the main shaft workings, as well as extending the lateral in the Newhouse tunnel, intending to upraise 365 ft. to connect with the 900-ft. workings of the Saratoga.

United Mining & Exploration Co.—This company, operating the Modoc mine on Quartz hill, has leased the Wheeler stamp mill up North Clear creek and will have a switch to connect with the Gilpin tramway lines for cheaper shipping of ores. An air-compressor plant has recently been installed and heavy shipments will follow. J. Lyng, Nevadaville, Colo., is superintendent.

Reform Group.—A mining deed has been placed on record conveying from the National Gold Mining & Milling Co. to James G. Kenney, of Denver, the Reform group, 10-stamp mill and tramway, situated up Silver Creek in the Silver Lake district, the consideration being $30,000. Arrangements are being made for starting up the property, installing new machinery and carrying on active operations.

Pleasant Valley Mining & Milling Co.—This company has purchased at sheriff's sale the concentrating machinery formerly on the King property operated by the Nevada Gold Mining & Milling Co., and is moving it to its property on the Banta-Hill ranch, where a concentrating plant is to be erected. The company is installing machinery and erecting new shaft-buildings on three of its shafts. It intends to carry on operations by the leasing system on a large scale. The company has offices in Central City.

Hampton.—A new shaft-building is being erected and a 16-h.p. Model gasoline hoister made at Auburn, Ind., will be installed by Denver owners and operators. W. H. Chittenden, Central City, is manager.

CLEAR CREEK COUNTY.

Vesper.—Chicago capitalists have purchased this property in East Argentine district for $30,000, and it is reported that a company is being organized for its future operation. D. W. Shephard, of Georgetown, Colo., is in charge.

Bertha Mill.—This mill, at Idaho Springs, has been purchased at sheriff's sale by Dr. T. J. McClanahan, of Booneville, Mo., and has been leased to A. Gustafson and others, of Idaho Springs, and will be run as a custom mill.

St. Paul Mining Co.—A stockholders' meeting was held last week at Georgetown, when it was decided to instal machinery for driving a tunnel from the base of Green mountain.

Domino Mining Co.—Eastern people, who are interested in this property in the East Argentine district, have decided to instal power drills for driving the tunnel. Harvey Cochran, Georgetown, Colo., is superintendent.

Loop Mines & Tunnel Co.—Denver men have become interested in a group of 25 claims and mill site, and are organizing a company intending to instal a plant of machinery for driving the tunnel to open up their holdings. The property is located on Republican mountain, near Silver Plume.

Mount Theresa Gold Mining & Milling Co.—This company has been organized with a capital stock of $500,000, with W. E. Carver, Idaho Springs, Colo., as manager. It will commence work on the Big Chief and Moore properties up Squirrel gulch, and is contemplating the erection of a power plant on Soda creek for operating an air compressor.

BOULDER COUNTY.

United States Gold Corporation.—This company has purchased the controlling interest in the Boulder Gorge Mining, Milling & Power Co.'s holdings, consisting of 1½ miles of patented claims along the apex of the Livingstone dike. The company intends to instal a large power plant, with air-compressors, and will drive a large tunnel. The property is located at Sugar Loaf, Colo., and Edward Monroe is president and general manager.

Eldora Chlorination Mill.—It is reported that John H. Kemp, of Boulder, is going to remodel the mill at Eldora and make it a cyanide mill, with the intention of treating custom ores in the Eldora district.

CLEAR CREEK COUNTY.

Waldorf Mining & Milling Co.—At the annual meeting of the stockholders, the officers and directors were re-elected and the quarterly dividend rate, which for the past two years has been 0.5c. per share, was increased to 1c. per share. A cash offer of $300,000 for the Stevens mine and mill was made to the company, and it is reported that same may be accepted. Arrangements are being made to drive a crosscut tunnel 12,000 ft. in length, which will intersect the Waldorf orebodies at a depth of from 3,000 to 5,000 ft., work to take four years and to cost between $300,000 and $350,000, all of which has been provided for. The property of the company is situated at East Argentine, E. J. Wilcox being president and general manager.

Hoosac Tunnel.—New buildings are being erected and the new plant, consisting of air compressor and other machinery, will soon be installed. The tunnel is in 600 ft., and is to be driven at least a mile further, toward Gilpin county. New Jersey people are interested, with E. D. Quigley, Idaho Springs, as manager.

Independent Mining Co.—It is reported that this company has made arrangements to purchase the East Griffith property at Georgetown for the sum of $250,000, and will work it in conjunction with the West Griffith property. Chicago and Pittsburg steel men are interested in the Independent Co., and if the deal is consummated, a large mill will probably be built near the base of Griffith mountain for the concentration of the low-grade ores. John Larson, Georgetown, Col., is manager.

IOWA.

The biennial report of the State mine inspectors for the two years ending June 30, 1905, has just been made public. The State is divided into three districts, John Verner, James A. Campbell and Edward Sweeney being the inspectors. The production of coal and the number of men employed for the fiscal years 1904 and 1905 were as follows:

	1904.	1905.	Changes.
Coal mined	6,214,379	6,806,011	I. 591,632
No. of miners	300	326	I. 26
Av. per employee	381	386	I. 5
Miners	11,198	12,197	I. 999
Other inside men	3,285	3,587	I. 302
Total underground	14,483	15,784	I. 1,301
Outside men	1,832	1,840	I. 8
Total	16,315	17,624	I. 1,309

Coal was produced in 23 counties; of these three—Monroe, Polk and Appanoose—report more than 60% of the total output.

The number of persons killed and injured during the two years was as follows:

	1904.	1905.	Changes.
Killed	31	24	D. 7
Injured	84	100	I. 16
Total number	115	124	I. 9
Killed per 1,000 employed	1.90	1.36	D. 0.54
Injured per 1,000 employed	5.15	5.67	I. 0.52
Total	7.05	7.03	D. 0.02

Only serious injuries are reported. The causes of accident are given as follows:

	1904		1905	
	No.	Per Ct.	No.	Per Ct.
Falls of roof or coal	70	60.9	79	63.7
Shaft accidents	13	11.3	5	4.0
Shot explosions	5	4.3	7	5.7
Fire damp	1	0.9	..	...
Cars	18	15.6	25	20.2
Miscellaneous	8	7.0	8	6.4
Total	115	100.0	124	100.0

The high proportion of accidents due to falls of coal and roof is in line with that reported from other coal-mining States. The Iowa mines, however, seem to be generally free from gas, and well ventilated.

LOUISIANA.

CALCASIEU PARISH.

Jennings.—West Virginia Oil Co. No. 2 has been completed and is flowing 4,500 bbls. daily. Bass & Benckenstein wells No. 1 and No. 2 and 6 are now flowing a

large amount of salt water. No. 1 is the gusher which has produced nearly 2,000,000 barrels.

SAINT MARTIN PARISH.

Breaux Bridge.—Lake No. 1, siuated in the Anse le Butte field, has been brought in at 1,760 ft. The present output of the field is 350 bbl. daily.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

Calumet & Hecla.—It is a month since the steeple-compound stamp-head in the mills at Lake Linden went into commission. No tests have been made yet, and until its rock tonnage is equal to that of the other heads, no data will be taken. It is not intended that the new head is to treat more rock than the other type, but its economy will be effected through a lessening of the steam consumption. The office of the assay and surveying staff is being moved to another site at the mine.

Centennial.—Work in the drifts north from No. 1 shaft in the lower levels is revealing some excellent rock. There has been a gradual improvement in the average mill returns the last few months. The north drifts are expected to cut the rich shoots of copper making southward from the South Kearsarge and Wolverine mine, and some valuable territory will be opened shortly.

Isle Royale.—Developments south of this company's land on the Baltic amygdaloid bed are important. The Isle Royale owns a large tract which undoubtedly carries the extension of this lode, and it is possible that steps will be taken to prove its value. In August the mine produced 225,000 lb. of refined copper.

Old Colony.—Sinking has been resumed in the active shaft on this property, after a suspension of a number of years. It was bottomed at a depth of 580 ft. From that point crosscuts were extended to tap the various amygdaloid lodes previously cut by diamond-drill borings, and where indications were sufficiently promising, drifts were opened on the course of the beds. No important copper values were revealed. It is the purpose of the management to continue sinking in the shaft until a depth of 1,000 ft. has been attained, and then it is likely that crosscuts will be extended to paralleling veins and their values again tested.

Osceola Consolidated.—It is likely that the proposed new shaft at the North Kearsarge branch will be started next summer. It will be north of No. 3. Extensive development work in that direction has been done through drifts northward, and by the time the new shaft is started it will be possible to sink and raise on the strike-line, making its opening very rapid. At the South Kearsarge branch both shafts are bottomed in rich copper rock. Shipments of rock to the mills from this branch average 1,250 tons daily. At the old Osceola mine rock shpments average nearly 1,000 tons daily. The mineral yield of the later averages 25 lb. per ton of rock stamped, practically the same as that of the North Kearsarge branch. The fourth head at the mills on Torch lake has been remodelled to the steeple compound type, and the daily rock capacity is now 4,000 tons.

Rhode Island.—The opening of the Kearsarge amygdaloid bed at the Tecumseh, which adjoins this property on the north, calls attention to the possibilities on that lode. There are 640 acres underlaid by the Kearsarge bed, and it is understood that development work will be started shortly.

Tecumseh.—Engineers in the employ of the Mineral Range railroad are surveying a spur to the location of the new shaft on the Kearsarge bed. It will also extend to the location of the second shaft, where a diamond drill is operating to locate the lode, after which shaft sinking will be resumed. Work at the first shaft will not progress very rapidly until the temporary power plant is completed.

KEWEENAW COUNTY—COPPER.

Calumet & Hecla.—This company has three diamond drills operating on its mineral land holdings in this county. Nothing has been made public regarding results.

Keweenaw Central Railroad.—Building operations on this road have stopped entirely at the Cliff property, owing to the refusal of the Tamarack Mining Co. to grant a right of way across that tract. Condemnation proceedings have been instituted, but this will take some time, causing the loss of the remainder of the season. President Charles A. Wright, in order to obviate this state of affairs, went to Boston to secure an adjustment. While he was away the Mineral Range immediately started a survey practically paralleling the Keweenaw Central. The Mineral Range is allied with the Tamarack interests, and it is questionable whether the interruption of the Keweenaw Central at the Cliff was not prearranged. It is also questioned whether the Mineral Range really intends to build its line. It is generally believed that the Keweenaw Central has the moral, if not the financial backing of the Calumet & Hecla Co. President Wright, of the former, negotiated the options for the Calumet & Hecla when it made its large purchases of Keweenaw county mining lands, closing deals for the Keweenaw Copper Co.'s at the same time.

Keweenaw Copper Co.—Two diamond drills are in service exploring for the Kearsarge amygdaloid formation.

Miskwabik.—Diamond drill exploratory work at the Miskwabik has been started. The diamond drill has been rigged up in the bottom of the shaft and the hole is being put down on an incline to conform with the plane of the lode. The shaft is 170 ft. deep, and it was necessary to pump out the water, which partly filled the openings, before the drill was rigged up. After a core has been extracted at this point another boring may be made from the bottom of a pit 2,000 ft. northward.

Mohawk.—No. 2 shaft has been sunk to the twelfth level, where the lode is considerably better than above. The concrete skip road is completed to the bottom of No. 5 shaft, 200 ft. deep, and sinking and drifting will be started at once. The fourth stamp at the mill on Traverse bay will be ready for use next month.

Phoenix Consolidated.—Machinery and supplies at this property, where work was discontinued during the summer, are being sold off as rapidly as possible. A large amount of heavy machinery was sold to the Atlantic Mining Co. and the Wolverine company has taken much of the supplies.

ONTONAGON COUNTY—COPPER.

Adventure Consolidated.—Work on a new shaft, No. 4, was started at this mine a few days ago. It is 2,200 ft. east of No. 3. A pit was first opened to explore the ground. The Knowlton lode was exposed to a depth of 15 ft., showing good copper values. The lode is 8 ft. wide. A Nordberg hoisting engine and a battery of boilers that have not been used for some time will be moved to the new shaft. At a point 1,000 ft. further east on the Knowlton lode, another pit is being opened, with good results.

Michigan.—A diamond drill is being rigged up in the bottom of the shaft on the Rockland property. This shaft has just been pumped out to the bottom openings, 450 ft. below the adit level and 550 ft. from the collar of the shaft. A drift will be driven northward to unwater a stope on the North vein, the shaft being on the South vein, 100 ft. distant. As soon as the water is out, the vein will be explored thoroughly. It is believed to be identical with the Branch vein, which is giving excellent results east of B shaft. The hoist in use there is to be replaced by a permanent engine of Allis-Chalmers make, and the old hoist will be moved to the Rockland shaft.

National.—A new vein, identity unknown, has been opened on this property. It is not connected with any of the other veins heretofore worked or discovered on this or the Michigan properties, and is several thousand feet away from the known ore bodies. The lode traverses section 8. While the openings are small, the showing in copper is good. It is not likely that the find will be investigated at present, as the company is not disposed to assume an active policy.

MINNESOTA.

CARLTON COUNTY.

Hartman Bros., together with some others, of Duluth, are sinking exploration

shaft pits near Mahtowa, in this county, in the search for coal. There have been some finds of carbonaceous slate, highly pyritic, and these have excited attention. The chances are slim. It was this pyrite that in times past led other individuals to get up a gold excitement in the same locality, with the usual result.

CASS COUNTY.

Several parties of explorers, trying to get a line on the possible western extension of the Mesabi range, have been through this county recently. They have found what seem to be indications of iron ore bearing formation south of Leech lake and some 30 miles west of the western end of the Mesabi, as it is now known, and 40 to 45 miles north of the new Deerwood district, where iron ore of poor grade has been found in some quantity. It is probable that a number of drills will be sent into this new section during the coming winter, and the public will be regaled with a lot more fairy tales, such as have been coming out of northern Minnesota for some time past.

CROW WING COUNTY.

It is reported that the Shenango Furnace Co., in sinking holes on some leases that it is exploring southeast of Brainerd, has cut ore; it is of the usual variety common to the range, but may improve with depth.

OREGON.

BAKER COUNTY.

Imperial.—The Imperial mine in the Cable Cove camp, 40 miles west of Baker City, under the management of A. L. McEwen, is making a good showing. The principal stockholders of the property are Michigan people and are holding a meeting in Detroit this week. The Imperial shipped large quantities of ore during August and is preparing for a heavy winter's work.

Highland.—The Highland mine in the Rock Creek district, 16 miles west of the city, has finished installing an Elspass mill and will put the same in operation in a few days, when the electric motor arrives from the East. The orebodies in the Highland are giving satisfactory returns of good milling and shipping ore.

Snake River Copper.—The Blue Bird and Companion groups on Snake river, 60 miles east of Baker City, were sold recently, including the Snakoline springs, adjoining property, to Eastern capitalists for $60,000. The owners had done considerable development work and the property shows good copper ore. It is understood the owners will begin development in the near future and announce their plans and corporate name later.

United Elkhorn.—Owner F. P. Hays, of Philadelphia, of the United Elkhorn mine, 16 miles northwest of Baker City, spent one day here this week. This is one of the three largest producing mines in the Baker City camp, and Manager Field having just completed his station on the 400-ft. level, is largely increasing the output of his property.

Sumpter Smelter.—After having been closed down for several weeks on account of repairs, the Sumpter smelter has started operations again with full supplies of ores. Manager Fred D. Fuller expects to be able to keep the smelter in operation during the entire winter.

Landore Smelter.—The Landore smelter, owned by the Ladd Metals Co., of Portland, situated on Snake river, 60 miles east of Baker City, it is announced will open for business Sept. 15. The smelter was built to take care of the ores in the Seven Devils' country.

PENNSYLVANIA.

ANTHRACTE COAL.

Philadelphia & Reading Coal & Iron Co.—This company's statement for August and the two months of its fiscal year from July 1 to Aug. 31 is as follows:

	August.	Two Months.
Earnings	$2,279,361	$4,124,359
Expenses	2,191,024	4,025.875
Net earnings	$88.337	$98,484

For the two months there were decreases of $494,790 in earnings and of $360,558 in expenses; with a resulting loss of $134,232 in net earnings.

Philadelphia & Reading Railroad.—The new storage plant of this company, at Abrams, known as the Bridgeport Transfer, is in operation. This plant, with a capacity of over 1,000,000 tons, is one of the most complete and modern of its kind, and will be of great assistance to the Reading in handling its surplus coal. The company has considerable coal of the smaller steam sizes stored there.

BITUMINOUS COAL.

It is announced that the Elm Grove Coal Co. and the Morehead Coal Co. are merged, and that the new company will immediately begin extensive operations, mainly in river coal markets. The properties owned consist of 4,000 acres in West Virginia and about 6,000 acres in Pennsylvania. They have a river connection and will use both the water and rail routes in marketing their product. D. H. Rearsall, of Pittsburg, has been the active promoter of the deal (involving over $1,000,000) and will remain with the new company.

Bessemer Coke Co.—This company recently bought the Mack coal lands, of 100 acres, near Masontown, for about $120,000. This tract contains a seam of the Connellsville coking coal and adjoins the company's Griffin works. The Bessemer Co. also recently purchased about 1,200 acres of coal lands in West Virginia; 30 coke ovens have been erected on the property, with houses for the workmen. Other improvements at the Bessemer works include installation of machinery at the Griffin works; the construction of a block of 300 new coke-ovens has also started; when completed, the Bessemer Co. will have a total of 1,400 ovens.

FAYETTE COUNTY.

Perry Manufacturing Co.—This company, with a capital of $50,000, is developing a valuable mineral tract at Perryopolis. The tract consists of 26 acres, and on it are clays for the manufacture of cores in tube and pipe casting; clay for daubing coke-oven doors; a 4-ft. layer of potters' clay; a 4-ft. layer of silica rock for the manufacture of fire-brick; a 4-ft. seam of coal, and finally a layer of molders' sand. The company proposes to develop all of these deposits and is already shipping material out of the tract.

SOUTH DAKOTA.

CUSTER COUNTY.

Saginaw.—Preparations are being made to push work on this property all winter. The shaft-house has been enlarged and covered, and the shaft has reached a depth of almost 300 ft. Explorations with the diamond drill show good values at a depth of 500 ft. The company will sink to that depth as quickly as possible. L. P. Woodbury, president, reports that work will be pushed rapidly to reach this point.

LAWRENCE COUNTY.

Homestake.—This company will erect a 1,500-ton cyanide plant for treating the slime. It will be built in Deadwood, on McGovern hill. The slimes from the 1,000 stamps of the company will be treated and brought down Deadwood and Whitewood gulches by gravity in iron pipes. The company treats 4,000 tons of ore a day. Tailings from 2,500 tons of these can be treated in the cyanide plants. Tailings from the other 1,500 require to be filter-pressed, and will be treated in the new plant. Work begins at once. Cost is estimated at $300,000 in all.

Spearfish.—The output of this mine has been increased 50 tons a day. The mill, which is a dry-crushing process, handles from 250 to 260 tons of rock daily. The increase was affected by the installation of a new set of rolls and finer crushing. Plenty of ore is in sight, and about 75 men are employed.

Victoria.—This company's new 200-ton mill will shortly be in operation. Nearly all the machinery has been installed. The company has a large amount of cyanide ore of good grade, of which there is already sufficient quantity on the dump to supply the mill for some time. The manager is Freeman E. Steele.

Bumble Bee.—The richest strike of ore made for many months has just been encountered in this claim. The rock assays high in gold and silver. The ledge, which is 7 ft. wide, was encountered at the extremity of a 200-ft. tunnel, driven in the base of the hill at water level. This property is located near the Wasp No. 2, and is owned by James McKibbon and John Snyder.

Coal Trade Review.

NEW YORK, Oct. 4.

ANTHRACITE.

The hard-coal market is constantly improving, principally under the influence of the large manufacturing consumers. Domestic trade is not yet vigorous, owing to the prevailing warm weather. The small sizes are in active demand, so much so that an advance of price is confidently expected in the near future. Many consumers are stocking large quantities of pea coal, providing additional storage room for it in many cases. Even the washery coal is moving off quickly.

Prices remain as follows: $4.75 for broken and $5 for domestic sizes. Steam sizes: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice and $1.30@$1.35 for barley, f. o. b. New York harbor shipping points.

BITUMINOUS.

In the soft-coal market, demand is generally strong, though an exceptionally heavy arrival at New York harbor has temporarily weakened the market at that point. Prices for the ordinary steam grades this week range from $2.50 to $3.60, f. o. b. shipping points. Car supply is variable, according to the railroad, the individual and the promptness shown in unloading arrivals at tide.

The far East shows a strong demand, particularly at the shoal-water points, which are getting in their coal as fast as the supply of coal and vessels will permit. Along the Sound, demand is much stronger than supply; this territory is now trying to make up for its procrastination during the summer months. New York harbor is taking in large supplies, and the market is momentarily weak. All-rail trade is calling for heavy supplies, although shippers are slighting it in favor of tidewater business. Ordinary grades are selling for $1.25 at the mines. Car supply is variable, though transportation is good on all roads.

Vessels in the coastwise market are in fair supply, though not up to the demand, and rates are firm. Philadelphia quotes as follows: To Boston, Salem and Portland, 75@80c.; to Lynn, Newburyport, Gardner and Bangor, $1; to Salem, 70c.; to Portsmouth, 80@85c.; to Bath, 85c. New York charges 55@60c. to around the capes.

COAL TRAFFIC NOTES.

The coal and coke originating on all lines of the Pennsylvania railroad east of Pittsburg and Erie were as follows for the year to Sept. 23, in short tons:

	1904.	1905.	Changes.
Anthracite.....	3,213,012	3,315,720	I. 102,708
Bituminous.....	19,466,859	21,056,370	I. 1,589,511
Coke.....	6,137,460	7,932.991	I. 1,795,531
Total.....	28,817,331	32,305,081	I. 3,487,750

The increase in coke was 29.2%; the gain in the total tonnage was 12.1% only.

Birmingham. Oct. 2.

The coal situation in Alabama is unchanged. The strike of the union miners, which began in July, 1904, is felt to a certain extent, though the companies whose mines are affected say that their production is becoming more and more satisfactory.

The organization of new coal companies continues in this State, and coal properties in the various coal-bearing counties will be developed from time to time. Some of the improvements began by coal companies in the early part of the year are already beginning to bear fruit.

The coke production in this State shows very little improvement. There is a strong demand for coke at home, but the ovens in operation are far from satisfying the needs. Those companies able to sell coke, and there are not many in this position, are receiving a good price for the commodity. Quite a number of new coke-ovens are under construction right now.

All kinds of labor around coal mines and the coke-ovens is very scarce. Labor agents are finding a hard task to get men.

Chicago. Oct. 2.

Conditions are gradually growing better in the coal trade, and dealers are more hopeful of continued betterment than they have been before this year. The market for bituminous, especially is improving, and prices are advanced or will be advanced this week 10@20c. on the higher-priced grades. Much of the prosperity for dealers, no doubt, is due to car shortage, which prevents too great shipments to the local market. For this condition many dealers are thankful; the Chicago trade has suffered long, though protestingly, against an oversupply of nearly every kind of coal.

The restriction of arrivals from Illinois and Indiana has cleared out demurrage coal, the great cause of low prices. With the continuation of mild weather, demand will not be heavy, though the advancing market causes many dealers to lay in stocks of bituminous.

Indiana and Illinois bring $2.30@$2.60 for lump, $1.60@$2 for run-of-mine, and 90c.@$1.30 for screenings. The market is weak only in screenings.

Of Eastern coals, smokeless is in good demand, Hocking is firm and Pittsburg and Youghiogheny are in small demand. The lack of cars is complained of by agents for Eastern as well as Western coals, and is advancing prices. New quotations for October business in smokeless are: 3.05@$3.30 for run-of-mine, and $3.90@$4.05 for screened lump and egg. Hocking brings $2.85@$3 for run-of-mine and $3@$3.15 for lump; these prices are for October business. Youghiogheny, on the little spot business that is being done in three-quarter coal, sells for about $2.90.

Anthracite is improving slowly, sales being heavier each week, but there is still much free coal sold at cut rates in the market.

Cleveland Oct. 3.

The coal trade in this territory is stiffening materially, more through the shortage of cars than through any increase in the demand. In the matter of steam coal for consumption in this territory, the market has been a little stronger, but the indications are that the car shortage is principally responsible. It is expected that before the week is out the price will advance to $1 at the mines for both Ohio and Pennsylvania run-of-mine. Sales during the past week have been made on the basis of 95c. at the mines. There is a good, strong demand for slack, but the supply has been unexpectedly satisfactory and prices have not changed. The market is holding firm at 50c.@60c. for Pennsylvania at the mines and at 60c.@70c. at the mines for the Ohio slack. Domestic coal situation has not changed, prices being firm.

The lake situation is remarkably dull. What is most unusual at this time of the year is that some of the plants handling coal over the docks are now idle a good part of the time. This indicates a remarkable slump in the demand in the Northwest. Rates of carriage are unchanged at 30c. to the head of the lakes and 40c. to Lake Michigan. The price is firm at $1.90 f. o. b. boats at Lake Erie ports. The coke market is still strong and gaining ground, but with prices steady at $3 at the oven for the best grades of 72-hour foundry coke and with furnace coke selling at $2.50, although lower grade cokes are selling below these figures.

Pittsburg. Oct. 3.

Coal.—The shortage of railroad cars is becoming more acute, and as a result prices are firmer. The Pittsburg Coal Co. has advanced the price of coal at the docks 10c. for run-of-dock, and 15c. for lump, effective Oct. 2. Early in September prices were advanced a straight 15c. a ton. The Hocking Valley operators also advanced prices, and lump is now quoted at $1.50 a ton at mine. In the Pittsburg district prices are about the same as last week, based on $1.10 a ton for run-of-mine at the mine. The price of slack has been advanced from 60 to 70c. a ton. Operations were resumed yesterday at several idle mines, but at a number it was impossible to get full production, owing to the car shortage. The outlook is for higher prices for the fall and winter trade.

Connellsville Coke.—There has been a stiff advance in coke prices. Standard Connellsville furnace coke is quoted this week at $2.50 a ton for delivery during the rest of the year, and for foundry coke $3 is asked. Some contracts have been made for shipment next year, but the

prices named have not been made public. The Pittsburg Coal Co., which operates over 600 ovens, the product of which is regarded as equal to strictly Connellsville coke, has just closed two contracts—one with the Republic Iron & Steel Co. for 90,000 tons for delivery through next year at the rate of 7,500 tons a month, and one contract with the Lackawanna Steel Co. for 60,000 tons, or 5,000 tons a month during the year. The price is not given. A shortage of cars in the region retarded shipment, as it was impossible to make deliveries on all demands, but 100 more cars were sent out than in the former week. The production in the Connellsville field amounted to 259,972 tons, and the shipments aggregated 11,285 cars distributed as follows: To Pittsburg and river points, 4,126 cars; to points west of Pittsburg, 5,940 cars; to points east of Everson, 1,209 cars. The shipments from the Masontown field amounted to 67,340 tons, and the aggregate shipments from both regions amounted to 329,220 tons for the week.

Iron Trade Review.

NEW YORK, Oct. 4.

The iron and steel markets continue extremely active in all directions. The demand for pig iron and finished material threatens to run over bounds, as consumers are rushing in to secure supplies before prices go up; and by this action really force the advances which they wish to forestall. A great deal of construction is in progress and planned; and business is certain to be active through the first half of 1906—through the whole year, if consumption is not checked by too high prices.

There is talk of speculative buying of pig iron, but it is not easy to trace such purchases, and rumors of this kind are likely to be exaggerated. The Steel Corporation has been a large buyer of iron from outside makers, as explained in our Pittsburg letter.

Birmingham. Oct. 2.

The Alabama pig-iron market is in a very healthy condition, the demand strong and prices very firm. Some of the manufacturers are holding their iron back a little for a better price, and are confident that before long consumers will be willing to get the iron at almost any figure. The production in this State is holding up well, and preparations are being made to improve the output as soon as possible. A report is current that several inquiries have been received for iron to be delivered during the first half of next year. Though there is a policy in this section not to sell more than a quarter ahead, some of the inquiries are resulting in business, and quite a volume of trade is aggregating for 1906 delivery.

The following quotations for iron are given: No. 1 foundry, $13 to $13.50; No. 2 foundry, $12.50; No. 3 foundry, $12; No. 4 foundry, $11.50; gray forge, $11; No. 1 soft, $13; No. 2 soft, $12.50.

There is a better demand for finished iron. Announcement is made that the Republic Iron & Steel Co. will start up its big Birmingham rolling mills Oct. 9. The puddling department will first go into operation, and this will be followed immediately by the guide, bar and other mills.

There is no change in the steel situation in this State. The production is steady, and every ton is finding an outlet.

Chicago. Oct. 2.

The local market is strong for pig iron and iron products, and indications are for continued strength. There is no boom, and nobody in the trade wishes a boom, but there is solid strength and heavy buying, with an advance in prices. Northern pig is now selling at close to $17 for No. 2, though some orders, on the most favorable terms to the furnaces, have been placed as low as $16.50. Southern brings a minimum of $12.50, Birmingham, for No. 2, with many sales reported at $13; this makes a range in Chicago of $16.15@$16.65.

There is considerable selling for immediate delivery, in small lots, but much contract business is being done for the first half of 1906. Northern iron is probably the chief seller, Southern being scarce and several furnaces reporting no iron to sell. Some sales of Southern, where the iron is specially desired and quick delivery can be guaranteed, are reported at even more than the $13, Birmingham, price.

Coke is very strong, arrivals being restricted by the car shortage and the demand being very good; Connellsville 72-hour brings $5.40, with Southern cokes 15@50c. less.

Cleveland. Oct. 3.

Iron Ore.—While the official figures are not yet obtainable, indications are that the ore movement down the lakes during September was upward of 4,500,000 tons. The grain movement had not become a factor and demand for coal tonnage was limited, leaving the ore trade in control of the available tonnage. Rates of carriage remain unchanged at 75c. from the head of the lakes, 75c. from Marquette, and 60c. from Escanaba.

Pig Iron.—The dangerous element of speculation has entered into the pig-iron trade and is giving it an appearance of strength which in a way is artificial. Some consumers are buying in advance of their needs and are storing in their yards in anticipation of higher prices a little later on. This, of course, is strengthening the present market situation materially. Bessemer, basic and malleable are sold at a minimum of $15 in the Valleys, with some sales for spot delivery at $15.25 in the Valleys, and with many sales for advanced delivery at $15.50. The foundry trade is not quite so strong, the speculative element having no hold there. The market is extremely bullish, however, with $15 the minimum and with some advance sales at $15.50.

Finished Material.—The market has been strong throughout, with specifications against all contracts extremely heavy, many of the consumers showing a tendency to specify in advance of their actual needs.

Philadelphia. Oct. 4.

Pig Iron.—The coke situation will have a serious influence upon the quotations for pig iron for future delivery. Besides the advances which have been made, others are threatened, and buyers of coke who are now endeavoring to arrange for future deliveries are face to face with higher prices. Several transactions have been closed at a marked advance for pig iron, and quite a number of concerns are not willing to close pending negotiations until they can see more clearly into the future. All kinds of foundry iron are meeting with fair sale, but the bulk of the business within the past three or four days has been of rather small lots, when compared with the transactions of two or three weeks ago. All mills are filling up, with business, and the foundry people are booking big orders. As a result of all this activity there is a renewal of pressure for pig iron. In the absence of exact quotations only the figures can be given as follows, namely: No. 1X foundry, $17.50@$18; No. 2X foundry, $17@$17.25; No. 2 plain, $16.75@$17.25; standard gray forge, $16; basic, $16.50; low phosphorus, $21@$21.50.

Steel.—Large lots of steel billets have been contracted for, but considerable trouble was experienced in obtaining assurances of satisfactory delivery. The average price today for ordinary steel is $27.50@$28, and for forging billets two or three sales were made at as high as $35.

Merchant Bar.—Merchant bar has moved up a little beyond the official quotations. Quotations ordinarily are 1.63½, but more money is being paid.

Sheets.—While there has been no actual change in quotations, some urgent buyers have readily paid more money this week for special accommodations.

Pipes and Tubes.—The pipe and tube market is very strong under active inquiry and an urgent demand for quick delivery.

Plates.—An extraordinary demand for plates continues; for the present there is something of a lull in the East, but it is more the fault of the mill people than of the customers.

Structural Material.—A good deal of material is being called for, but the diffi-

culty lies in the inability of manufacturers to make specific promises as to date of delivery. Quotations are 1.83½@2 cents.

Steel Rails.—The latest reports from the steel-rail makers is that additional orders are in sight. Quotations are $28 and mill capacity is oversold.

Scrap.—The scrap market is strong and active, and prices are held very firmly at $16.50 for scrap steel rails; and $16.25 for No. 1 steel scrap. Railroad is very scarce at $21.50, and No. 1 yard scrap is $19. Machinery scrap is $16, and is practically out of the market.

Pittsburg. Oct. 3.

There is greater activity in the pig-iron market, both in buying and inquiries. All grades are now held at higher prices and some interests will not sell bessemer iron at less than $15.50, Valley furnaces. Some sales were made during the week at $15.25, but it is doubtful if this rate can be duplicated. The two leading independent interests have entered into an agreement to maintain a minimum price of $15.50, and to observe strict secrecy regarding all business done. The purpose of this seems to be to prevent a boom that might disturb conditions and interfere with a steady market throughout the coming year. There is no doubt that 1906 will be a record breaker, and it is not forgotten that the boom year, 1899, was followed by a period of depression. The United States Steel Corporation did not buy for the fourth quarter as had been expected, but increased its September purchases by 45,000 tons last Wednesday. The Bessemer Pig Iron Association got 25,000 tons, W. P. Snyder & Co., 15,000 tons and an independent interest 5,000 tons. Of this tonnage 5,000 tons were to be delivered at once and the rest went over until this month. The price was $15, Valley furnaces. The Corporation is expected to buy from 30,000 to 40,000 tons this month, for which it will likely be forced to pay a higher price. The Westinghouse interests have bought 25,000 tons of foundry iron, all of which goes to the works in this district, except a tonnage for the Cleveland branch of the electric company. The iron is of different grades and the price was on a basis of $15.85, Pittsburg, for No. 2. About 1,000 tons of bessemer iron was bought by the air brake interest. The demand for foundry iron is very heavy, according to the many inquiries received, and it is impossible to do less than $15.85, Pittsburg. Basic iron is not active, the only important sale of the week being 6,000 tons for delivery extending into next year at $15, Valley. Gray forge also has advanced in price and the minimum is $15. Pittsburg. One sale of 3,000 tons has just been closed at that figure and it is doubtful if less than $15.25 can be done on some business that is now under negotiation. Some Southern foundry iron has been sold in this market on a basis of $12, Birmingham. There are a number of large inquiries for all grades of pig iron for delivery next year but no quotations are being made. Several furnaces are reported to be storing the product, in anticipation of much higher prices before the end of the year. The increase in the price of coke is likely to put prices up to $16, Valley, for bessemer iron, before the close of the month; basic and foundry No. 2 also may reach that figure.

There has been a notable improvement in all lines of finished steel products, including merchant pipe, which has been weak for some time. Billets continue scarce and premiums of from $4 to $5 a ton above the pool price can easily be obtained. A leading independent steel concern has closed a deal for 5,000 tons of bessemer billets with another independent interest, giving scrap in exchange. A similar deal for from 10,000 to 15,000 tons is now under negotiation and may be closed this week. The Columbus steel plant of the Carnegie Steel Co. has just been started on sheet-bars and tin-plate-bars and preparations are being made to put in operation a number of the idle mills of the American Sheet & Tin Plate Co. If the material required can be assured it is intended to have all of the mills in full operation by Oct. 15. Most of the independent sheet and tin-plate mills are running, but not in full owing to inability to get bars. The Carnegie Steel Co. has booked about 100,000 tons of steel rails within the past week and a leading steel manufacturer declared today that there is now from 1,750,000 to 2,000,000 tons of rails on the books of the different companies for next year. This estimate includes the tonnage that will go over. The plate tonnage is phenomenal and the demand is increasing. A straight advance of $2 a ton is likely to be ordered this month. According to the latest estimates, the steel car concerns have fully 50,000 cars booked which will keep the plants in steady operation until July 1 and longer. The structural mills also are filled with business away into next year. Merchant steel bars are expected to be advanced about $2 a ton within a short time. Agricultural implements makers are placing additional orders for bars for deliveries extending through next June.

P. J. McArdle, of Muncie, Ind., yesterday succeeded T. J. Shaffer as president of the Amalgamated Association of Iron, Steel & Tin Workers. He has not mapped out a policy, but will call a meeting of the advisory board for this week, at which plans for the future will be considered. The new president is strongly opposed to open mills and has denied the request of the Whitaker-Glessner Co., with sheet and tin-plate plants at Wheeling and Martin's Ferry, to permit that concern to run its works without signing the Amalgamated scale, although the company agrees to pay the scale rates.

Pig Iron.—Sales of pig iron during the past week aggregate nearly 100,000 tons. Bessemer iron is quoted at $15.50, Valley furnaces; foundry No. 2, $15.85@$16, Pittsburg, and gray forge, $15@$15.25, Pittsburg.

Steel.—Billets are scarce and bessemer billets are firm at $25@$25.50 and open-hearth at $26@$27. Merchant steel bars remain firm at 1.50c., but will probably be advanced shortly. Plates are firm at 1.60c.

Sheets.—The sheet market shows some improvement and it is now impossible to obtain any concessions. Black sheets are firm at 2.30c. and galvanized 3.30c.@3.35c. for No. 28 gauge.

Ferromanganese.—The market is stronger and the minimum price named this week is $55 per ton.

Cartagena, Spain. Sept. 16.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that there were no shipments for the week, owing to scarcity of available tonnage. Business continues good, and new contracts are coming in for next year.

Quotations are unchanged. Ordinary 50% ore is 6s. 6d.@6s. 9d.; special low phosphorus, 6s. 10d.@7s. 8d.; specular ore, 58% iron, 10s. 3d.; S. P. Campanil, 9s. All prices are f. o. b. shipping port. Manganiferous ores, same terms, range from 10s. 6d. for 35% iron and 12% manganese, up to 17s. for 20% iron and 20% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton.

London. Sept. 15.

Exports of iron and steel and manufactures thereof, including machinery, from Great Britain, for the eight months ending Aug. 31, are valued by the Board of Trade returns as follows:

	1904.	1905	Changes.
Iron and steel	£18,371,267	£20,471,662	I. £2,100,395
Machinery	10,064,597	10,819,113	I. 754,516
New ships	2,918,428	3,063 710	I. 145,282
Total	£31,354,292	£34,354,485	I. £3 000,193

Exports of mining machinery were valued at £588,002 in 1904, and £552,389 in 1905; a decrease of £35,613. The loss was chiefly in shipments to South Africa, which amounted to £169,891 this year.

The leading items of the iron and steel exports for the eight months were, in long tons:

	1904.	1905.	Changes.
Pig iron	554,862	647,306	I. 92,444
Wrought iron	115,481	118,763	I. 3,282
Sheets	250,885	261,700	I. 10,915
Plates	96 597	128,293	I. 31,696
Rails	346 661	369 496	I. 22,835
Steel ingots, etc	76 449	96,635	I. 20,186
Tin plates	229,725	247,189	I. 17,464
All other kinds	471,942	554,704	I. 82,762

There were gains in all items. The total increase in quantities was 280,484

tons, or 13.1%. Shipments of pig iron to the United States this year were 120,509 tons, an increase of 83,491 tons. Shipments of tin-plates to the United States were 46,631 tons this year, a decrease of 2,160 tons.

Imports of iron and steel into Great Britain for the eight months ending Aug. 31 were valued at £5,803,144 in 1904, and £5,335,250 in 1905; a decrease of £467,894. Imports of machinery were valued at £2,975,747 in 1904, and £3,168,387 in 1905; an increase of £192,640 this year. The chief items of the iron and steel imports were, in long tons.

	1904.	1905.	Changes.
Pig iron	93,814	76,296	D. 17,518
Wrought iron	70,317	59,502	D. 10,815
Steel ingots, etc	365,267	362,648	D. 2,619
Structural steel	87,507	76,985	D. 10,522
All other kinds	262,619	259,427	D. 3,192

The total decrease in quantities was 42,666 tons, or 4.8%. The imports of iron ore were: Manganiferous, 198,881; other, 4,703,134; total, 4,902,015 tons, showing an increase of 801,265 tons over last year. Of the imports this year, 128,870 tons manganiferous ore and 3,705,556 tons other ore were from Spain.

Heavy Chemicals and Minerals.

NEW YORK, Oct. 4.

The market for heavy chemicals holds even and firm, with no special features except for American sulphur, which is firm.

Latest advices are that an agreement has actually been reached, by which the Louisiana producers are to have control of the American market, and also a share of the foreign market. Particulars as to the division of foreign trade are not made public. This probably means that no Sicilian brimstone will be imported. The only competition here will be between the home sulphur and pyrite.

A statement from the leading American producer is as follows: "This agreement does not necessarily mean an advance of prices, but that uniform prices will be maintained, and that the struggle to control certain markets of the world will cease. It was necessary to come to an agreement. When I tell you that we can mine and ship sulphur 99½% pure to Sicily, and sell it in their market below their own cost price of production, you can understand how we have and can cut into their trade. On the other hand, this would react to commercial disadvantage if we started a cut-throat campaign, for it would stir up various countries to discriminate in their tariff against American productions.

"For instance, a cargo sent by us to France analyzed 99.9, or almost pure. Now that sulphur was just as it came out of the mine, but they assessed it at the rate for pure sulphur, which is much higher than that on the crude article. The Sicilian averages 98%, and is received at the tariff rate for crude sulphur. This same discrimination would probably be enforced against us by Germany, Belgium, the Netherlands and other countries, and our only recourse was to mix our almost pure sulphur with sand or come to some agreement. The Italian Foreign Office in Paris had secured a ruling from the French Customs Department that all Louisiana sulphur should hereafter be subjected to analysis, and the duty for refined sulphur collected if possible.

"But now we have reached an agreement which is satisfactory to all concerned. It gives the Louisiana sulphur the best of the world's market. This country can produce 500,000 tons annually with present facilities."

Pyrite continues unchanged and in steady demand.

Sulphate of copper holds at about the same figures, and a fair business is reported.

Nitrate of soda shows no change.

Phosphate companies report the same quotations, with firm markets, and freights.

PRICES.

Sulphur.		
Louisiana, N. Y., Boston or Portland	ton	$22.50
Philadelphia	"	23.00
Sicilian, Atlantic ports	"	22.25
Pyrite.		
Domestic, furnace size	Unit	11c
Fines	"	10c.
Imported, lump, At. ports	"	10@11c.
" fines " "	"	9½@10c.

Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.

Acids.		
Boric, crystals	per lb.	.10
powdered	"	.10½
Carbonic, liquid gas	"	.12½
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Nitric acid, 36°, 100 lb		$4.75
38°, 100 lb		5.25
40°, 100 lb		5.50
42°, 100 lb		5.75
Oxalic acid, com'l, 100 lb		$5.00@ 5.25
Sulphuric acid, 50°, bulk, ton		13.50@14 50
60°, 100 lb. in carboys		1.05
60°, bulk, ton		18.00@20.00
66°, 100 lb. in carboys		1.20
66°, bulk, ton		21.00@23.00
Blue Stone (Copper Sulphate), car-load lots, per 100 lb		$5.30
Nitrate of Soda, 100 lb		2.20@ 2.12½
Sulphate of Ammonia, per 100 lb		3.10@ 3.15

Phosphates.	F. o. b.	C. I. F. Gt. Britain or Europe.
***Fla., hard rock**	$7.25@7.50	$10.67@11.85
land pebble	3.75@4.00	7.70@ 8.40
†**Tenn., 78@80%**	4.35@4.40	10.27@10.67
78%	3.75@4.00	.....
75%	3.40@3.50	.....
68@72%	3.00@3.25	.....
‡**So. Car. land rock**	3.75@4.00	.....
river rock	3.50@3.75	6.33@ 6.61
Algerian, 63@70%		7.04@ 7.71
58@63%		6.15@ 6.60
Tunis (Gafsa)		6.00@ 6.60
Christmas Isle		13.28@14.11
Ocean Isle		13.60@14.45
Somme, Fr		11.39

***F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.**

Foreign Chemical Trade.—Exports of phosphate and chemicals from the United States for the eight months ending Aug. 31 were as follows:

	1904	1905.
Phosphates, tons	584,813	634,236
Acetate of lime, lb	41,366,593	45,378,677
Copper sulphate, lb	24,847,710	17,092,666

Germany takes the acetate of lime. The chief exports of phosphates this year were 190,558 tons to Germany, 100,994 tons to Italy, 100,193 tons to the United Kingdom, and 69,353 tons to France.

Imports of sulphur and pyrite for the eight months were as follows, in long tons:

	1904.	1905.
Brimstone	99,251	58,355
Pyrite	242,903	328,962

The noticeable decrease in sulphur is due to the increased home production. The imports of phosphate and nitrate of soda were as follows, in long tons:

	1904.	1905.
Phosphates	65,481	50,577
Nitrate of soda	196,412	214,431

The imports of heavy chemicals for the eight months were as follows, in pounds:

	1904.	1905.
Bleaching powder	58,220,051	67,461,993
Potash, chlorate	83,427	20,631
Potash, muriate	71,516,209	103,955,214
Potash, nitrate	8,437,741	8,222,613
Other potash salts	43,310,868	47,978,543
Caustic soda	1,535,112	1,449,004
Sal soda	3,386,028	809,237
Soda ash	12,002,963	9,735,387
Other soda salts	6,576,614	7,000,700

Imports of potash salts increased; but there was a large falling off in soda salts.

Metal Market.

New York, Oct 4.

Gold and Silver Exports and Imports.

At all United States Ports in August and Year.

Metal.	August.		Year.	
G'ld	1904.	1905.	1904	1905.
Exp	$10,762,818	$274,153	$80,295,460	$41,265,017
Imp	7,764,491	2,146,223	64,453,535	24,699,625
Exc	E. $2,998,327	I. $2,872,070	E.$15,841,825	E$16,565,392
Silv.				
Exp	4,848,932	4,549,485	35,751,145	33,915,751
Imp	2,517,578	2,316,162	17,674,195	20,437,438
Exc	E. $2,331,354	E. $2,233,323	E.$18,076,950	$13,478,313

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce of Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending September 30, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$5,500	$1,639,835	$1,255,454	$363,811
1905	32,289,943	3,090,535	26 424,821	3,551,334
1904	73,161,064	4,128,567	29,311,383	727,889
1903	31,402,005	6,514,385	23,167,886	2 950,425

Imports of gold for the week were chiefly from France: exports were to the West Indies. Imports of silver for the week were from Mexico and South America; exports were chiefly to London.

The gold taken abroad is beginning to arrive, but has not yet relieved the situation in New York. There is talk of arranging for imports from Australia; none have been made thus far this year.

The statement of the New York banks —including all the banks represented in the Clearing House—for the week ending Sept. 30 gives the following totals, comparison being made with the corresponding week of 1904.

	1904.	1905.
Loans and discounts	$1,430,033,960	$1,071,630,300
Deposits	1,217,797,100	1,080,465,100
Circulation	40,576,000	54,066,100
Specie	244.367,100	201,506,000
Legal tenders	78,745,600	76,050,300
Total reserve	$323,112,700	$277,556,300
Legal requirements	303,199,275	270,116,275
Balance surplus	$19,913,425	$7,440,025

Changes for the week this year were increases of $1,051,600 in specie, $470,700 in legal tender, $353,800 in circulation and $2,204,975 in surplus reserve; decreases of $4,810,300 in loans and $2,730,700 in deposits.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York Associated	$201,506,000	.....
England	173,144,980	.....
France	593,562,540	$219,360,285
Germany	168,220,000	56,070,000
Spain	74,685,000	112,780,000
Netherlands	32,990,500	30,329,000
Belgium	16,166,065	8,083,335
Italy	123,710,000	16,299,000
Russia	566,745,000	27,000,000
Austria	230,930,000	61,920,000

The returns of the Associated Banks of New York are of date Sept. 30, and the others Sept. 29. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

Shipments of silver from London to the East for the year up to Sept. 21 are reported by Messrs. Pixley & Abell, as follows:

	1904.	1905.	Changes.
India	£7,462,088	£4,335,121	D. £3,156,967
China	372,722	758,688	I. 385,566
Straits	58,103	11,675	D. 55,303
Totals	£7,892,913	£5,105,484	D. £2,826,704

Receipts for the week were £6,000 from Australia, £7,000 from the West Indies and £246,000 from New York; a total of £259,000. Exports were £30,000 to India, £400 to the Straits and £8,875 to China; £39,275 in all.

Indian exchange is a little easier, but all the Council bills offered in London were taken at an average of 16.03d. per rupee. Silver shipments from London to India have been rather light.

The silver market has been quite steady, with some inquiry for futures—say November delivery. On the whole, conditions favor the price of silver as likely to remain on higher level than a year ago.

SILVER AND STERLING EXCHANGE.

Sept.	Sterling Exchange.	Silver. New York Cents.	Silver. London, Pence.	Oct.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
28	4.85	61⅛	28 7/16	2	4.8520	61⅛	28⅛
29	4.85	60⅞	28 5/16	3	4.85⅛	61⅛	28⅛
30	4.85⅛	60⅞	28	4	4.85⅛	61⅛	28⅛

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars	$0.47	$0.49
Peruvian soles and Chilean pesos	.43	.45
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

Other Metals.

Daily Prices of Metals in New York.

Sept.-Oct.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
28	16⅜ @16⅝	16 @16¼	71⅝	32⅛	4.85	5.90 @6.00	5.75 @5.85
29	16⅛ @16⅜	16 @16¼	71⅛	32⅛	4.85	5.90 @6.00	5.75 @5.85
30	16⅛ @16⅜	16⅛ @16⅜	....	32⅛	4.85	5.90 @6.00	5.75 @5.85
2	16¼ @16½	16¼ @16½	71⅛	32⅜	4.85	5.95 @6.00	5.80 @5.85
3	16¼ @16½	16¼ @16½	71¼	32⅝	4.85	5.95 @6.00	5.80 @5.85
4	16¼ @16½	16¼ @16½	71⅛	32⅜	4.85	5.95 @6.00	5.80 @5.85

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars.

Copper.—The last few days have established without question that there is very little copper available up to the end of the year, and it is a fortunate thing for the industry that consumers are well supplied for this period, else a squeeze, which would be undesirable for all concerned, could hardly be avoided. Consumption, both in this country and abroad, is excellent, and the outlook for next year is very promising. Some contracts have been made for delivery in 1906 at fair concessions from spot prices, the latter having advanced on small purchases of belated buyers. The market closes firm at 16¼@16½c. for Lake copper and electrolytic in ingots, cakes and wirebars; 16⅛@16⅜ for cathodes; 15¾@16c. for casting copper.

The standard market has advanced further, owing to conditions mentioned in last week's report, at one time touching £71 15s. for spot, £71 for three months; but there is a slight reaction at the close, the quotations being £71 2s. 6d. for spot, £71 for three months.

Statistics for the second half of September show an increase in the visible supplies of 400 tons.

Refined and manufactured sorts we quote: English tough, £74@£74 10s.; best selected, £75 10s.@£75 15s.; strong sheets, £84; India sheets, £79; yellow metal, 6⅞d.

Exports of copper from New York for the week were 3,190 tons. Our special correspondent reports the exports from Baltimore for the week at 1,537 long tons of fine copper.

Copper Imports and Exports.—Exports of copper from the United States, for the eight months ending Aug. 31, are reported as below by the Bureau of Statistics of the Department of Commerce and Labor; the figures given are in long tons, of 2,240 lb. each:

	1904.	1905.	Changes.
Copper	156,827	169,439	I. 12,612
Copper ore, etc.	11,767	22,791	I. 11,024

The contents of copper ore are not given. Estimating them, chiefly on the basis of values, we find that the total exports this year were equivalent to 172,460 tons of fine copper. The exports of metallic copper to various countries were as follows, in long tons:

	1904.	1905.	Changes.
Great Britain	32,624	19,521	D. 13,103
Other Europe	122,352	111.414	D. 10,938
China	604	30,824	I. 30,220
Other countries	1,247	7,680	I. 6,433
Total	156,827	169,439	I. 12,612

The decrease in exports to all countries except China was 17,608 tons, while the increase in shipments to China was 30,220 tons; so that the gain this year was entirely in Chinese trade.

Imports of copper and copper material into the United States for the eight months ending Aug. 31, with re-exports of foreign material, were as follows, the figures giving the equivalent, of all material, in long tons of fine copper:

	Metal.	In Ore, etc.	Total.
Mexico	30,167	8,170	38,337
Canada	6,686	3,957	10,643
Great Britain	5,429	....	5,429
Other countries	1,469	1,324	2,793
Total	43,751	13,451	57,202
Re-exports	482	.....	482
Net imports	43,269	13,451	56,720

The net imports given above were less than the exports by 115,740 tons. The ores and matte received from Mexico this year reached a total of 60,312 tons, carrying 8,170 tons of copper; from Canada and Newfoundland, 111,788, carrying 3,957 tons of copper. The imports from Great Britain consist largely of bars sent here to be refined.

Tin.—There has been a fair business doing at advancing quotations, the market at the close being steady at 32⅜@32⅝c.

The bull party in London has taken hold of the market during the last few days, and an advance of almost £3 resulted, so that quotations for spot reached £148 15s., and for three months £147 15s. The close is steady, at a slight reaction, the quotations being £148 7s. 6d. for spot, £147 10s. for three months.

Statistics for the month of September show an increase in the visible supplies of 700 tons.

Exports of tin from The Straits for the seven months ending July 31 are reported as follows, in long tons:

To:	1904.	1905.	Changes.
United States	10,834	10,532	D. 302
Great Britain	17,687	17,080	D. 607
Other Europe	4.455	4,822	I. 367
China	801	280	D. 521
India	1,039	685	D. 354
Total	34,816	33,399	D. 1,417

A considerable part of the exports to Great Britain are intended for this country.

Imports of tin into the United States for the eight months ending Aug. 31 are reported as follows; the figures being in long tons:

	1904.	1905.	Changes.
Straits	12,693	13,675	I. 982
Australia	232	362	I 130
Great Britain	13,393	13,201	D. 192
Holland	435	299	D. 136
Other Europe	270	564	I. 294
Other countries	22	28	I. 6
Total	27,045	28,129	I. 1,084

The total increase this year was 4%. The metal received from Great Britain is chiefly Straits tin.

Lead.—There is no change in the market, and a good business is doing at 4.85 New York, 4.77½ St. Louis.

The London market is again higher, Spanish lead at the close being quoted at £14 10s.; English lead, £14 12s. 6d.

Imports of lead in all forms into the United States, with re-exports of foreign lead, for the eight months ending Aug. 31, are reported by the Bureau of Statistics as below; the figures are in short tons, of 2,000 lb.:

	1904.	1905.	Changes
Lead, metallic	6,279	3,020	D. 3,259
Lead in ores and base bullion	70,664	64,289	D. 6,375
Total imports	76,943	67,309	D. 9,634
Re-exports	59,757	42,285	D. 17,472
Net imports	17,186	25,024	I. 7,838

Of the total imports this year 60,421 tons were from Mexico, and 6,381 tons from Canada; the balance from other countries. Exports of domestic lead were 151 tons in 1904, and 148 tons in 1905; a decrease of 3 tons this year.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is scarce and higher. The latest sales here are on a basis of 4.82½c. for Missouri brands, which is above the official price for desilverized lead.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of Sept. 18, that silver has been 15 reales per ounce. Exchange, 33.07 pesetas to £1. Pig lead has been 75.50 reales per quintal, equal, on current exchange, to £12 15s. 5d. per long ton, f. o. b. Cartagena. Shipments for the week were 397 tons argentiferous and 175 tons desilverized lead to Marseilles; 20 tons desilverized to London.

Spelter.—It appears that there is a scarcity of supplies in Europe, and that it will be necessary for American smelters to fill the gap. Quotations abroad have been advancing steadily toward our parity, but the domestic market is trying to keep at a safe distance, as it would seem that the entire production is required for our own wants, which are very heavy in all lines. Quotations at the close are 5.95@6c. New York, 5.80@5.85c. St. Louis.

The London market closes firm at £27 12s. 6d. for good ordinaries, £27 17s. 6d. for specials.

Exports of spelter from the United States for the eight months ending Aug. 31 were 3,231 short tons in 1904, and 2,090 tons in 1905; a decrease of 1,141 tons. In addition, there is reported this year 1,296 tons of zinc dross. Exports of zinc ore were 18,325 tons in 1904, and 18,227 tons in 1905; a decrease of 98 tons.

Zinc Sheets.—Sheet zinc is quoted at $7.50 per 100 lb. (less discount of 8%), f. o. b. cars Lasalle and Peru, in 600-lb. casks, for gauges No. 9 to 22, both inclusive, widths from 32 to 60 in., both inclusive, and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since January 1, 1905, have been as follows: December 30, 1904, $7.25; January 7, 1905, $7.50; May 12, $7.25; June 1, $7; July 29, $7.25; August 10, $7.50. The demand is reported active.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is quiet, but appears to have a strong undercurrent. The latest sales here are on a basis of 5.85c., East St. Louis, for prime Western, and 6c. for brass special.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Sept. 18, that prices are unchanged, at 80 fr. for blende, 35% zinc, and 60 fr. for calamine, 30% zinc. Shipments for the week were 2,100 tons blende to Stettin.

Antimony.—The market is lower, prices being 12@13c., depending upon brands and deliveries.

Imports of antimony into the United States for the eight months ending Aug. 31 were as follows, in pounds:

	1904.	1905.	Changes.
Metal and Regulus	2,506,076	3,173,135	I. 667,059
Antimony ore	1,501,043	1,252,829	D. 248,214

There was an increase of 26.6% in the metal and regulus, but a decrease of 16.5% in the ore imported.

Nickel.—Quotations for large lots, New York or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Exports of nickel, nickel oxide and nickel matte from the United States for the eight months ending Aug. 31 were 3,391,447 lb. in 1904, and 6,765,508 lb. in 1905; an increase of 3,394,061 lb. Imports of nickel ore and matte were 5,652 tons in 1904, and 9,204 tons in 1905; an increase of 3,552 tons this year.

Platinum.—Quotations are firm at $20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated wire, 90c.; and cones, $1 per gram.

Imports of platinum into the United States for the eight months ending Aug. 31 were 4,936 lb. in 1904, and 4,843 lb. in 1905; a decrease of 93 lb. this year.

Quicksilver.—The market is quiet. The New York quotation is $40 per flask of 75 lb. for large orders, and $40.50@$41 for small lots. San Francisco prices hold steady at $39 for domestic orders, and $37.50@$38 for export business. The London market is unchanged, £7 2s. 6d. being quoted both by first hands and jobbers.

Exports of quicksilver from the United States for the eight months ending Aug. 31 were 1,171,545 lb. in 1904, and 691,872 lb. in 1905; a decrease of 479,673 lb. this year.

Manganese Alloys.—Prices for manganese alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 500 kg., delivered in Bremen, and are as follows, per 100 kilograms:

	Marks
Manganese Copper, No. 1, 30% Mn	265
No. 2, 28% Mn	175
No. 3, 20 to 25%	165
Manganese Tin, No. 1, 55% Mn., no iron	365
No. 2, 55% Mn., some iron	225
Manganese Nickel, No. 1, free of iron	450
No. 2, traces of iron	270

Manganese metal is quoted at 3.60 marks per kg.—38.8c. per lb.—delivered in Bremen.

Minor Metals.—For minor metals and their alloys, wholesale prices are f. o. b. works:

Aluminum.	Per lb.
No. 1, 90% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled Sheets	4c. up.
Aluminum-Bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Cadmium, f. o. b. Hamburg	77c.
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	95c.
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (74%)	12½c.
Ferro-Tungsten (37%)	29c.
Magnesium, pure (N. Y.)	$1.60
Manganese (98@99% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N. Y.)	$1.75
Tantalic acid (N. Y.)	50c.
Thallium, f. o. b. Breslau, Germany.	65@70c.
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best), pound lots	90c.

Variations in prices depend chiefly upon the size and condition of orders.

Missouri Ore Market.

JOPLIN, Sept. 30.

The highest price reported for zinc ore was $55 per ton, the assay basis price $49 to $51 per ton of 60% zinc, and the average price $45.46 per ton of all grades. For the same week of last year the highest

price was $47, the assay basis price $40 to $43 per ton of 60% zinc, and the average price $40 per ton. The average price paid during the nine months of the year is $44.76 and for last year $33.62 per ton. The total value for the nine months of ths year is $9,784,125, with prospects of the year's total value reaching $13,000,000. It is now $1,958,880 ahead of last year. The shipment for this year aggregates 188,228 tons of zinc, against 193,354 tons in the corresponding nine months of last year.

Lead continues in strong demand at $63@$63.50 per ton, an average of $62.76, and though the price is high and the demand exceptionally good, the output of this ore appears to be falling off. The highest price a year ago was $53.50.

Although the United Zinc & Chemical Co. announced early in the week that it had transferred its future purchases to the West it had no effect in preventing a general advance of $1 to $2 per ton, but it is apparent that it will cut some figure in the shipments. The shipment for this week is approximately 400 tons below the output, which has once more reached 5,200 tons, for the first time since the inflow of water into the mines early in July, nearly three months ago. While the United Co. has been using but a little ore from this district for several weeks, it purchased approximately 390 tons per week all of last year. It removes an immediate demand for about 250 tons per week, having averaged that amount during the past two months.

Following are the shipments of zinc and lead for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Joplin	3,029,350	223,350	$82,770
Carterville-Webb City	1,871,530	494,100	59,540
Galena-Empire	1,115,390	126,670	27,230
Duenweg	575,310	118,440	15,440
Aurora	768,460	.....	14,120
Alba	416,030	46,390	12,270
Oronogo	340,180	.....	8,240
Granby	575,000	40,000	7,700
Neck City	222,130	.....	5,780
Carthage	164,360	.....	4,270
Badger	157,670	.....	3,780
Prosperity	51,770	56,340	2,990
Central City	70,940	4,650	1,780
Baxter Springs	63,980	.....	1,340
Diamond	54,740	.....	1,310
Reeds	53,410	.....	1,280
Wentworth	52,560	.....	1,260
Scott City	49,640	.....	1,230
Beef Branch	57,480	9,810	990
Spurgeon	45,470	.....	760
Totals	9,635,520	1,119,750	$254,080
9 months	376,456,780	45,971,340	$9,784,125

Zinc value, the week, $218,940; 9 months $8,425,585
Lead value, the week, 35,140; 9 months 1,358,540

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
Jan.	33.33	52.00	Jan.	55.55	61 50
Feb.	33.63	52.77	Feb.	56.37	57.62
March	35.40	47.40	March	57.20	57.20
April.	35.75	42.88	April.	58.00	58.00
May	34.87	43.31	May	57.77	58.27
June.	32.93	40.75	June.	56.60	57.80
July	33.37	43.00	July	53.00	58.00
August	37.55	48.83	August	53.00	58.00

Wisconsin Ore Market.

PLATTEVILLE, Sept. 29.

Zinc ore prices stiffened up materially the latter part of the week, the majority of the producers selling on an assay basis of $47 per ton. The highest price reported was paid for the Enterprise ore, selling at $50 per ton. The producers are taking advantage of the good weather, and are loading all the ore they can.

Most of the lead in the district sold at $27@$28 per 1,000 lb., the price being based on 75% lead content. Some choice lots were sold at $30 per thousand.

Mining Stocks.

New York. Oct. 4.

High rates for money have had less effect on the stock market than had been anticipated. The copper stocks showed some large dealings. Amalgamated closed higher, at $85¾. Tennessee Copper sold around $35; Union Copper, $1¼; United Copper, $34½ for the common, and $76 for the preferred. In the industrials, United States Steel closed at $39 for the common, and $105¾ for the preferred stock.

On the Consolidated Exchange the Comstock shares showed some sales, with a slight recovery in prices. The Cripple Creek stocks were not strong. Some of the new Tonopah stocks were dealt in, at a moderate range of prices.

Boston. Oct. 3.

It has been a very active week in mining shares and speculation continues unabated in them. The sharp advance in certain stocks has invited heavy realizing, yet the market has been broad enough to take all offerings and at the present writing has a healthy appearance. The belief is becoming general that this state of affairs is likely to continue throughout the Fall and well into next year. Prices in the present boom are yet considerably below the level reached in the big market of 1899 to 1901, notwithstanding the fact that the metal condition today is sound as compared with a fictitious 17-cent market five years ago. This is a sufficient basis to carry the movement along, especially in view of the fact that the mines are sold up well into the coming year, which will give continued good earnings.

North Butte has been the most conspicuous stock the past week, moving up steadily to $58.25 today; from this it broke to $55.25, subsequent rallying to $57.62½. It has recorded almost a $10 advance in the seven days. Fluctuations have been violent at times, but the market in it has been of great proportions, running up 9,000 shares today. The stock started on the curb here a few months ago at around $15 per share. Allouez, which is sometimes referred to as the second Wolverine, made another start and touched $41 Monday. This is $2 above a week ago, although it sagged to $37.75 in the meantime. The Allouez September mineral yield was 46.6 lb. to the ton treated and the profits, with the use of Centennial's stamp mill but one-half the time, ought to be well up to Aug. 1, when they were $22,000. Centennial has done much better, touching $29.37½ today; this is $2.87½ above a week ago. The September yield was 34½ lb. of mineral to the ton stamped, while but 11% of the rock was discarded. Earnings will be above expenses, the first time in Centennial's history.

Tecumseh rose $6.37½ to $16.25, but this level brought free offerings and the close tonight was $1.25 below this. A story is current that Calumet & Hecla interests have been buying the stock. One broker is known to have accumulated over 15,000 shares very recently. There is but 50% of the 100,000 shares outstanding. Rhode Island has been an active feature also, rising $2, to $8.62½, but reacted to $7.50 today. The movement is on expectation of finding the Kearsarge lode. Atlantic was freely offered last week, and fell $2, to $25.25, but it touched $27.25 Monday. Osceola spurted $8.50, touching $109.75, and Tamarack rose $13, to $136. Mohawk is up $1.75 to $60.25, Michigan $1.25 to $15.50, Mass $1 to $10.50. Franklin has been well bought, touching $18.62½, against last week's close at $16.50.

Copper Range was dormant around $72, but took a sudden spurt to $73.87½ today, and Trinity rose $1.37½ to $10.37½. The annual report of the latter was issued today and tells the same uninteresting nothingness. President Lawson says total expenditures for the year ended Sept. 30 were $27,309, but gives no other financial data. Of the cheaper stocks Arcadian touched $4.37½, Adventure $8.25, Elm River $3.37½, Old Colony $2.37½, Shannon 8.37½, Wyandot $2.75, and Victoria $6. Washington came out at 60c. and ran up to $1.25.

United States advanced $1, to $38.12½. It is learned that the London Rothschilds purchased 10,000 treasury shares of this stock some time ago and have lately been adding to it.

An attempt is being made to make the curb trading more of a feature in this city, and houses are combining for this purpose. Sales of Nevada Consolidated have been made up to $7.37½. Alimeek touched $63 and Majestic advanced from $1.50 to $2. Utah-Apex sold at $4.25 per share.

Colorado Springs. Sept. 29.

There has been more interest taken in Cripple Creek stocks during the past week, and trading on the exchange has been active, but with prices remaining very close to the quotations of one week ago. President Bernard, of El Paso, has issued a statement in which he gives the throwing of a large block of stock on the market by the Delaney Brothers, as the cause

for the recent decline, also the litigation started over the Beacon Hill Ajax claim. From present calculations the production of the Cripple Creek district for this year will equal, if not exceed, the best year of its history, which was about $18,000,000.

El Paso sold up during the week to 86½, but closed on today's market at 80½c. bid. Findley has dropped off about 3c., selling today for 75c. Elkton is selling for 52c.; Isabella for 28½c.; Portland at $2.25; Golden Cycle at 60c.; and United Gold Mines at 17c. per share.

San Francisco. Sept. 28.

The Comstocks were rather dull, with a tendency to lower prices. Ophir sold down to $5.25 and even a shade below. Consolidated California & Virginia was quoted at $1.25 and Hale & Norcross at $1.10. The North End stocks were especially slow.

The Tonopah stocks were more active with prices generally firm. Montana Tonopah brought $2.95@$3; North Star, 52c.; McNamara, 41c. per share.

Oil shares were dull. Oil City sold at 72c.; Piedmont, 7c. Transactions were generally small.

Dividends.

Company.	Payable.	Rate.	Amount.
Amer. Smelting & Ref.	Oct. 16	$1.75	$875,000
Amer Smelting & Ref., pfd.	Oct. 2	1.75	875,000
Anaconda Copper	Oct. 19	1.25	1,500.000
Central Coal & Coke	Oct. 15	1.50	76,875
Central Coal & Coke, pfd	Oct. 15	1.25	23,437
New Idria Quicksilver	Oct. 2	0.20	20,000
Penna. Salt Mfg. Co	Oct 16	3.00	60,000
Philadelphia Co.	Nov. 1	0.75	434,295
Tenn. Coal, Iron & R. R.	Nov. 1	1.00	225,536
Tenn. Coal, I. & R. R., pfd.	Nov. 1	2.00	4,960
Va.-Carolina Chem., pfd.	Oct. 16	2.00	360,000
Westmoreland Coal	Oct.	2.50	150,000
Wolverine	Oct. 7	6 00	360,000

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

Assessments.

Company.	Delinq.	Sale.	Amt
Anaconda Tonopah	Sept. 23	Oct. 14	0.02
Bullion	Sept. 14	Oct. 5	0 05
Bunker Hill	Sept. 27	.....	0.05
Con. Cal. & Va	Sept. 14	Oct. 5	0.25
Con. Imperial	Oct. 2	Oct. 26	0 01
Exchequer	Sept. 6	Oct. 10	0.05
Gould & Curry	Sept. 18	Oct. 6	0.10
Potosi	Sept. 5	Oct. 16	0.10
Sheba Gold and Silver	Sept. 15	Oct. 16	0 02
Yellow Jacket	Oct. 17	Nov. 22	0 10

St. Louis.

Sept. 23.

	High.	Low.
Adams	$ .40	$ .25
American Nettie	.09	.07
Center Creek	2.00	1.50
Central Coal & Coke	66.00	63.75
" " " pfd	79.00	77.50
Columbia	1.00	.25
Con. Coal	30.00	28.00
Doe Run	140.00	137.00
Granite Bimetallic	.20	.15
St. Joe	16.00	15 00

LONDON. (*By Cable.**) Oct. 3.

	£	s.	d.
Camp Bird	1	19	0
Consolidated Gold Fields	6	11	3
De Beers	18	9	0
Dolores	2	6	6
East Rand	7	7	6
El Oro	1	15	0
Esperanza	6	0	0@6 2 0
Modderfontein	8	17	6
Rand Mines	8	16	3
Rio Tinto	66	10	0
Simmer and Jack	1	13	6
Stratton's Independence	0	10	0
Tomboy	1	13	3

*Furnished by Wm. P. Bonbright & Co., New York.

STOCK QUOTATIONS.

NEW YORK. Week Oct. 4.

Name of Company.	High	Low	Clg.	Sales
*Amalgamated	88⅜	82⅝	84¾	180,620
Anaconda	125	121⅛	124	24,279
British Col. Copper	8¾	8	8⅝	11,500
Federal	113¾	111	112	1,700
Federal, Pf.	97⅞	92½	96¾	8,590
Greene Copper	26⅜	25⅝	26¼	26,310
Greene Gold	4¼	3¾	4¼	2,250
Mitchell	8¾	8⅛	8⅛	17,300
Tennessee Copper	35½	34	34⅞	1,000
Union Copper	1 7/16	1 1/16	1 3/16	11,000
United Copper,	35	32½	34	12,400
United Copper, Pref.	76⅞	75⅞	75⅞	510
White Knob	11/16	9/16	5/8	4.000

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	129	126	126¾	64,595
Am. Smelting & Ref., Pf.	122¾	120¾	121½	2,600
Colorado Fuel & Iron	47½	43⅞	46⅛	45,500
National Lead	48	46	46⅞	12,500
Pittsburg Coal	15½	14¼	15½	1,100
Pittsburg Coal, Pf.	59¾	57½	59½	18,00
Republic I. & S.	24⅜	22¾	24⅜	21,500
Republic I. & S., Pf	94	90	90⅜	12,200
Tenn. Coal & Iron	89¼	80½	88¼	17,100
U. S. Red. & Ref.	29	28¼	28½	500
U. S. Red. & Ref., Pf.	66¾	65	65	700
U. S. Steel	39	37⅛	38¾	257,537
U. S. Steel, Pf.	105¾	104	105	78,950
Bethlehem Steel	30	29½	29¾	2,312
Standard Oil	653	638	650	597

BOSTON.

Allouez	41	37	39¾	20,540
Amalgamated	85⅞	82⅝	84⅞	17,193
Atlantic	27½	25¾	25⅝	10,455
Bingham	32½	30¾	31½	7,730
Boston Consolidated	8½	8	8⅜	7,035
Calumet & Hecla	670	660	669½	207
§Centennial	29⅜	26⅝	28¾	26,790
Mercur	.60	.54	.57	3,685
Copper Range	73¾	71	71¾	15,696
Daly-West	14¼	14	14¼	220
Franklin	18⅝	15	17⅝	18,714
Granby	8	7¼	7¾	3,827
Green Con. Copper	26½	25½	26¼	6,566
Isle Royale	23¾	22	23½	3,755
‡Mass	10⅜	9¼	10¼	4,830
Michigan	15½	14	14⅜	7,641
Mohawk	60⅛	57¾	59⅛	3,775
*North Butte	58¼	48½	43½	24,332
Old Dominion	28	26	27¼	4,420
*Osceola	109¾	101½	109	8,015
*Parrot	27½	26	26½	2,156
Phoenix	1¼	.75	1	1,825
Quincy	108	103	107	376
Rhode Island	8⅝	5¾	7⅛	39,391
Shannon	8½	7¾	8⅛	13,102
Tamarack	136	123	133¾	1,025
Tecumseh	16¼	10⅝	15	46,448
United Copper, com	35	33¾	34¼	3,890
United States	38¼	36¼	37	16,257
Utah	47½	46½	46¾	9,576
Wolverine	118	116½	117¾	923

PHILADELPHIA.

Cambria Steel	29¾	27¾	29⅛	65,828
Philadelphia Co.	48⅛	48	48⅝	17,399
Tonopah	13¾	13½	13½	1,890

PITTSBURG.

Crucible Steel	13½	12¾	13⅛	6,626
Crucible Steel, Pref.	69	68	68¾	1,714
Tonopah Ext	6.05	6.00	6.00	720

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	70½	70½	51½	55
El Paso	80	80½	78	77
Isabella	28	28	28	28
Portland	215	220	215	220
Vindicator	75	75	75	75

SAN FRANCISCO.

Best & Belcher	1.10	1.20	1.10	1.10
Bullion	.36	.36	.36	.36
Caledonia	.43	.47	.43	.43
Confidence	.75	.75	.75	.75
Con. Cal. & Va	1.25	1.30	1.25	1.25
Gould & Curry	.19	.21	.19	.20
Hale & Norcross	1.10	1.10	1.00	1.00
Mexican	1.00	1.05	1.00	1.00
Occidental Con	.87	.87	.87	.87
Ophir	5.25	5.37½	5.25	5.25
Savage	.57	.59	.50	.50

*Ex-dividend. †1st Installment Paid.
‡Assessment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	58.046	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.430	57.832	25.578	26.664
June	55.673	58.428	25.644	26.910
July	58.095	58.915	26.760	27.163
August	57.806	60.259	26.591	27.822
September	57.120	61.695	26.349	28.528
October	57.923	.....	26.760	.....
November	58.453	.....	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	New York.				London.	
	Electrolytic.		Lake.			
	1904.	1905.	1904.	1905.	1904.	1905.
Jan.	12.410	15.008	12.553	15.128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.963
March	12.299	15.125	12.551	15.250	57.321	68.174
April	12.923	14.920	13.120	15.045	58.247	67.017
May	12.758	14.627	13.000	14.820	57.321	64.875
June	12.269	14.673	12.399	14.813	56.398	65.881
July	12.380	14.888	12.505	15.005	57.356	66.887
Aug.	12.343	15.664	12.468	15.725	56.952	69.830
Sept.	12.495	15.965	12.620	15.978	57.645	69.667
Oct	12.993	.....	13.118	.....	60.012	.....
Nov.	14.284	.....	14.456	.....	65.085	.....
Dec.	14.661	.....	14.849	.....	66.384	.....
Year.	12.823	.....	12.990	.....	58.587	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	28.845	29.325	July	26.573	31 760
Feb.	28.087	29.262	August	27.012	32.866
Mar.	28.317	29.523	Sept.	27.780	32.095
April	28.132	30.525	Oct	28.596	.....
May	27.718	30.049	Nov.	29.185	.....
June	26.325	30.329	Dec.	29.286	.....
			Av., year.	27.986	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July	4.192	4.524
Feb.	4.375	4.450	Aug.	4.111	4.665
Mar	4.475	4.470	Sept.	4.200	4.850
April	4.475	4.500	Oct	4.200	.....
May	4.423	4.500	Nov.	4.200	.....
June	4.496	4.500	Dec.	4.600	.....
			Av., year.	4.309	.....

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905.	1905.
January	4.863	6.190	4.673	6.032	25.063
February	4.916	6.139	4.717	5.989	24.594
March	5.057	6.067	4.841	5.917	23.825
April	5.219	5.817	5.038	5.667	23.813
May	5.031	5.434	4.853	5.284	23.594
June	4.760	5.190	4.596	5.040	23.875
July	4.873	5.396	4.723	5.247	23.938
August	4.866	5.706	4.716	5.556	24.675
September	5.046	5.887	4.896	5.737	26.375
October	5.181	.....	5.033	.....	.....
November	5.513	.....	5.363	.....	.....
December	5.872	.....	5.720	.....	.....
Year	5.100	.....	4.931	.....	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.

DIVIDENDS.

Gold, Silver, Lead, Quicksilver and Zinc Companies—U. S.

Name of Company and Location.		Author-ized Capital	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Alaska Mexican, g.	Al'ka	$1.000,000	180,000	5	$1.185,381	July 1905	$ .30
Alaska Treadwell,g.	Al'ka	5,000.000	200,000	25	7,860 000	July 1905	1.00
Amalgamated, c,..	Mont	155,000,000	1,530,879	100	30,807,629	Aug. 1905	1.25
Am.Sm.&Ref.,com.	U. S.	50,000,000	500.000	100	5 250.000	Oct. 1905	1.75
Am. Sm & Ref. pf..	U. S.	50,000 000	500 000	100	19,391,553	Oct. 1905	1.75
Am. Smelters, pf. A		17,000,000	170,000	100	255,000	Sept. 1905	1.50
Am. Smelters. pf. B		30,000,000	300.000	100	375,000	Sept. 1905	1.25
Anaconda,c.....	Mont	30.000,000	1,200,000	25	26,850.000	Oct. 1905	1.25
Annie Laurie, g....	Utah	5.000,000	25,000	100	465,061	July 1905	.50
Arizona, c.....	Ariz	3,775 000	.....	.....	6,186,826	Apr. 1905	.....
Atlantic, c.....	Mich	2,500,000	1 0.000	25	990,000	Feb. 1905	.02
B. & H., l z.....	Mo	400,000	400,000	1	32,000	Aug. 1905	.01
Boston & Montana.	Mont	3 750,000	150.000	25	43.025,000	July 1905	10.00
Bunker Hill & Sull.	Ida	3,000,000	300 000	10	4,896 000	Sept. 1905	.50
Butte & Boston, c..	Mont	2 500,000	200,000	25	1.800,000	Feb. 1904	1.00
Calumet & Arizonac	Ariz	2 500,000	200,000	10	2.900.000	Sept. 1905	2.00
Calumet & Hecla,c.	Mich	2,500,000	1 0,000	25	90,850,000	Sept. 1905	10.00
Camp Bird, g.....	Colo	5,500,000	820 000	5	2,050,104	May 1905	.18
Center Creek, l. z ..	Mo	1.000.000	10 000	10	170.000	Oct. 1904	.10
Central Eureka, g..	Cal	4 000,000	400 000	10	643,159	July 1905	.07
Century, g. s. l....	Utah	150.000	150.000	1	30,000	July 1904	.02
C. K. & N.,g	Colo	1 500,000	1,431,900	1	229,104	Dec. 1904	.01
Continental, z.....	Mo	550,000	22 000	25	121.000	July 1905	.50
Copper Range Con.	Mich	38 500 000	383 781	100	1,101,343	Sept. 1905	1.00
Creede United, g...	Colo	1,625.000	1,625,000	1	173,428	July 1905	.02
Cripple Creek Con g	Colo	2.000,000	2,000,000	1	180,000	Mar. 1905	.00½
Daly West, g. s. l ..	Utah	3,600,000	180.000	20	4.859,000	Sept. 1905	.60
De Lamar, g. s	Ida	400.000	67.180	5	2,926,370	May 1905	.72
Dillon, g.....	Colo	1,250,000	1,250,000	1	21,875	July 1905	.01
Doe Run, l.....	Mo	1,500,000	15,000	100	752,072	Apr. 1905	1.50
Dutchess, g	Colo	1,000 000	1.000,000	1	20.419	Feb. 1904	.01
Elkton Con., g.....	Colo	3 000,000	2,500 000	1	1,491 961	May 1905	.00½
El Paso, g.....	Colo	2,500,000	2 450,000	1	951,250	Aug. 1905	.02
Fed. Sm , con.....	Idaho	10 000.000	50.000	100	603 750	Sept. 1905	2.50
Federal Sm., pf....	Idaho	20,000 000	100,000	100	1,426.250	Sept. 1905	1.75
Findley, g.....	Colo	1,250 000	1,250 000	1	50,000	May 1905	.01
Gemini-Keystone ..	Utah	500,000	5 000	100	1.300,000	Aug. 1905	10.00
Gold King Con	Colo	5 750 370	5,750.370	1	1,407 504	May 1905	.01
Gold Sovereign	Colo	2,000 000	2,000,000	1	10 000	Jan. 1905	.00½
Grand Central, g...	Utah	250,000	250 000	1	1,031 250	Aug. 1905	.05
Hecla, s l.....	Idaho	250 000	1 000 000	25	350 000	Apr. 1905	.01
Homestake, g.....	S. D	21 840,000	218.400	100	13,787,350	Aug. 1905	.50
HornSilver,g.s.c.z.l	Utah	10,000 000	400,000	25	5,462.000	Mar. 1905	.05
Iron Silver.....	Colo	10.000,000	500,000	20	3,350,000	Sept. 1905	.10
Jamison, g.....	Cal	3 900 000	390,000	10	202,100	July 1905	.03
Jerry Johnson.....	Cal	2,500,000	2,500,000	1	25,000	July 1905	.01
Kendall, g.....	Mont	2,500.000	500 000	5	780.000	July 1905	.05
Liberty Bell, g.....	Colo	700.000	130,349	1	169,441	Oct. 1904	.15
Lightner, g.....	Cal	125,000	102,255	1	295.694	Aug. 1905	.05
Lucky Budge, z....	Mo	40,000	400	100	46,800	Apr. 1905	12.00
Lyon, z. l	Mo	50 000	4.585	10	2 117	Jan. 1905	.20
Mammoth, g. s. l...	Utah	10.000 000	400,000	25	1,980 000	Nov. 1904	.05
Mary McKinney, g.	Colo	1 000,000	1,000,000	1	567,000	Oct. 1904	.03
Mines Co. of Am ...	U. S.	2,000,000	2,000,000	1	1,065,000	Aug. 1905	.01½
Mont. Ore Purch...	Mont	2,500 000	81.000	25	4,104 000	May 1905	4.00
Monument, g.....	Colo	300,000	300.000	1	27,124	Apr. 1905	.01
Nat'l Lead, pf.....	U. S.	15 000 000	149 040	100	14,346 780	Sept. 1905	1.75
Nevada Keystone, g	Nevada	1,000,000	638 877	1	61,790	Feb. 1904	.03
New Century. z	Mo	150,000	150,000	1	21.000	July 1905	.02
New Idria, q	Cal	500 000	100,000	5	780.000	Oct. 1905	.20
New Jersey, z.....	U. S.	10,000,000	100,000	100	8,100.000	Aug. 1905	3.00
North Butte.....	Mont	.....	.....	...	400,000	Sept. 1905	.50
North Star, g.....	Cal	2,500 000	250,000	10	931,356	July 1905	.30
Northern Light,g s.	Utah	2,000,000	400,000	5	20,000	Feb. 1904	.05
Old Gold	Colo	2.101,150	2 101 150	1	10,506	Mar. 1904	.05
Ophir, g. s	Nevada	302,400	100.800	3	1,797,400	July 1904	.25
Osceola, c	Mich	2,500.000	96.150	25	4,821.200	July 1905	2.00
Oustomah, g	Cal	250,000	250,000	1	12,500	Mar. 1904	.05
Parrot, c,s.....	Mont	2,300,000	229,850	10	6,347,950	Sept. 1905	.50
Peacock Valley, l.z.	Mo	25,000	2,500	10	47,500	May 1905	.....
Pennsylvania, g...	Cal	5,150,000	51,500	100	284.925	July 1905	.10
Penn-Wyoming	Wyo	10,000,000	10000000	1	50,000	July 1905	.01½
Portland, g.....	Colo	3,000,000	3,000,000	1	6,157.080	July 1905	.10
Quicksilver, pf.....	Cal	4,500.000	43.000	100	1,931.411	May 1903	.50
Quilp, g	Wash	1 500 000	1,500,000	1	15 000	Apr. 1904	.01
Quincy, c	Mich	2,500,000	100,000	25	15,220 000	Aug. 1905	3.00
Red Bird, g s. c l..	Mont	1,500,000	300,000	5	72,000	Dec. 1904	.01
Rob Roy, z.....	Mo	15,000	14,325	1	3,375	Dec. 1904	.03
Rocco Homest'k,l.s.	Nevada	300,000	300.000	1	94 000	Jan. 1904	.01
Sacramento, g	Utah	5,000.000	1,000,000	5	213.000	Aug. 1904	.01½
Salvator, g. s l.....	Utah	200 000	200,000	1	6.500	Aug. 1904	.01
St. Joseph, l.....	Mo	6,000,000	375 000	10	4,059,500	Dec. 1904	.15
Silver Hill, g. s	Nevada	180,000	180 000	1	55 800	Aug. 1905	.05
Silver King, g. s. l .	Utah	3,000,000	150,000	20	9,250 000	July 1905	.66⅔
South Swansea, g.s.	Utah	300,000	300 000	1	170 500	Apr. 1904	.01
Spearfish. g	S. D	1,500,000	1.500.000	1	165 500	Jan. 1905	.01½
Standard Con., g. s.	Cal	2,000,000	178,394	10	4,160,331	Sept. 1903	.10
Stratton'sIndepend	Colo	5.500,000	1,000 007	5	4 505,863	May 1905	.12½
Tamarack, c.....	Mich	1 500 000	60,000	25	8,700,000	July 1905	2.00
Tennessee, c.....	Tenn	5,000,000	175 000	25	437,500	Jan. 1904	1.25
Tomboy, g. s.....	Colo	1,500,000	300,000	5	1,316 000	Dec. 1904	.24
Tonopah of Nev....	Nevada	1,000,000	1,000,000	1	500,000	July 1905	.25
Uncle Sam	Utah	200 000	200 000	1	75 000	July 1905	.01
United Cop., Com..	Mont	45,000,000	450,000	100	450,000	July 1905	1.00
United, c. pf.....	Mont	5 000,000	50 000	100	750,000	Nov. 1904	3.00
United, z. l , com ..	Mo	5,000,000	92,400	5	27,450	Oct. 1903	.05
United, z. l., pf ...	Mo	1,000.000	19 556	25	197,084	July 1905	.50
United (Crip'le C'k)	Colo	5.000 000	4,009 100	1	280,071	Apr. 1905	.00½
United Verde, c....	Ariz	3,000,000	300 000	10	17,085.322	Dec. 1904	.75
United States,g.s.c.	Utah	21 500,000	480,000	25	780 000	July 1905	.75
Utah, g.....	Utah	1,000 000	100,000	10	225 000	June 1904	.01
Utah Con., c.....	Utah	1,500,000	300,000	5	3,636,000	July 1905	2.00
Victoria, Utah.....	Utah	250,000	250,000	1	17,500	Aug. 1905	.04
Vindicator Con., g.	Colo	1.500.000	1 100,000	1	1.302,000	July 1905	.04
Wash No. 2, g	S. D	500 000	147.900	1	234 679	June 1904	.03
Wolverine, c.	Mich	1,500,000	60,000	25	2,790,000	Oct. 1905	6.00
Work, g	Colo	1,500,000	1,500,000	1	15,000	May 1905	.00½
Yankee Con.....	Utah	500,000	500,000	1	160 000	Aug. 1905	.05
Yellow Aster, g.....	Cal	1,000.000	100,000	10	538,789	Feb. 1904	.15

Coal, Iron and Other Industrials—United States.

Name of Company and Location.		Author-ized Capital.	Shares. Issued.	Par Val. $	Dividends. Date.	Latest. Date.	Amt.
Ala. Con., C. & I., pf..	Ala	$2,500.000	$24,638	100	$905,265	May 1905	$1.75
Allis-Chalmers, pf ...	U S	25,000,000	200,000	100	3,213,750	Feb. 1904	1.75
Alma Oil	Cal	400,000	400,000	1	57,600	Nov. 1904	.03
Amer. Ag. Chem., pf..	U. S	20,000,000	181,350	100	6,286,790	Apr. 1905	3.00
American Cement....	Pa	2,000,000	200,000	10	820,000	July 1905	.30
American Coal.....	Md	1,500,000	50,000	25	1,682,500	Sept. 1905	1.25
Associated Oil.....	Cal	21,000,000	21,000,000	1	630,000	Aug. 1905	.01½
Bon Air C. & I., pf...	Tenn	2,500,000	18,803	100	249,757	Oct. 1904	1.50
Cambria Steel.....	Pa	50,000,000	900,000	50	9,150,000	Aug. 1905	.75
Caribou Oil.....	Cal	100.000	80,000	1	56,000	July 1905	.07
Central C & C., com..	Mo	5,125,000	51,250	100	1,166,250	Oct. 1905	1.50
Central C. & C., pf. ..	Mo	1,875,000	18,750	100	984,370	Oct. 1905	1.25
Central Oil	W. Va.	1,500,000	60,000	25	182,500	May 1904	.25
Claremont Oil...	Cal	500,000	450,000	1	58,500	June 1905	.01
Col. & Hock. C & I...	Ohio	7,000,000	69,244	100	173,086	Feb. 1905	.25
Consolidated Coal ...	Ill	5,000,000	50,000	100	350,000	July 1904	1.00
Consolidated Coal....	Md	10,250,000	102,500	100	7,356,650	Feb. 1905	4.00
Empire S & I., pf....	N. J	5,000,000	23,700	100	498,000	July 1905	1.50
Esperanza Oil.....	Cal	125,000	125,000	1	2,800	Oct. 1904	.01
Fairmont Coal, ...	W. Va	12,000,000	120,000	100	600,000	Feb. 1905	3.00
Four Oil.....	Cal	500,000	300,000	1	105,406	July 1905	.01
General Chem. com..	U. S	12,500,000	74,103	100	1,300,507	Dec. 1903	1.25
General Chem., pf....	U. S	12,500,000	100,000	100	3,625,178	Oct. 1905	1 50
George's C'k Coal	Md	2,500,000	22,000	100	1,188,000	July 1904	3.00
Home Oil.....	Cal	100,000	100,000	1	507,500	Oct. 1904	.02½
Ill. Crude Oil	al	200,000	200,000	1	12,500	Dec. 1904	.01½
Imperial Oil	Cal	1,000,000	100,000	100	880,000	July 1905	.20
Jeff & Cl'f C. & I , cm.	Pa	1,500,000	15,000	100	330,000	Aug. 1905	5.00
Jeff. & Cl'f. C. & I.,pf	Pa	1,500,000	15,000	100	750,500	Aug. 1905	2.50
Keystone Oil.....	Colo	2,000,000	2,000,000	1	8,000	July 1904	.00⅔
Kern River Oil.....	Cal	2,000,000	20,000	100	39,500	May 1905	.13
Lehigh Coal & Nav...	Pa	14,345,650	346,897	50	22,839,509	May 1905	2.00
Maryland Coal,pf....	Md	2,000,000	18,850	100	1,282,335	June 1905	3.50
Monon R. Coal, pf. ..	Pa	10,000,000	100,000	100	2,960,945	Jan. 1905	.77
Monte Cristo Oil.....	Cal	500,000	500,000	1	120,000	July 1905	.01
National Carbon, pf..	U. S	4,500,000	45,000	100	2,047,500	May 1905	1.75
New Central Coal	Md	1,000,000	50,000	20	290,000	May 1904	.40
Oil City Petroleum ..	Cal	500,000	500,000	1	55,000	July 1905	.00½
Pacific Coast Borax ..	Cal	2,000,000	19,000	100	2,086,500	Aug. 1905	1.00
Peerless Oil.....	al	1,000,000	92,000	10	396,320	May 1905	.14
Penna. Salt.....	Pa	3,000,000	60,000	50	13,928,000	Apr. 1905	3.00
Penna. Steel.....	Pa	25,000,000	168,214	100	5,271,997	May 1905	3.50
Phila. Gas, com	Pa	28,953,029	579,061	50	6,249,847	Aug. 190	.75
Phila. Gas, pf..	Pa	5,744,813	114,896	50	1,583,505	Mar. 1905	1.25
Pittsburg Coal, pf....	Pa	32,000,000	297,010	100	11,434,962	Apr. 1905	1.75
Pocahontas Coll., pf..	W. Va.	1,500,000	15,000	100	347,500	Aug. 1905	1.50
Republic I. & S., pfd.		.....	204,169	100	436,369	Oct. 1905	1.75
Sloss-Sheffield, com..	Ala	7,500,000	75,000	100	375,250	Oct. 1905	2.50
Sloss-Sheffield, pf....	Ala	20,000,000	67,000	100	2,556,750	O t. 1905	1 75
Somerset Coal.....	Pa	4,000,000	40,000	100	80,000	Feb. 1904	2.00
Standard Oil	U. S	100,000,000	970,000	100	270,735,000	Sept. 1905	6.00
Tenn. C. & I., com ...	Tenn	22,553,600	225,536	100	1,778,750	Nov. 1905	1.00
Tenn. C. & I., pf	Tenn	248,000	2,480	100	355,284	Nov. 1905	2.00
Texas & Pacific Coal.	Texas	2,000,000	20,000	100	1,930,000	Mar. 1905	2.00
Thirty-three Oil.....	Cal	500,000	100,000	5	430,000	July 1905	.10
Union Oil	Cal	10,000,000	100,000	100	1,118,766	May 1905	.50
Union National Gas .	Pa	9,000 000	90,000	100	1,260,000	Apr. 1905	2.00
U. S. Steel Corp., cm.	U. S	550,000,000	5,083,025	100	53,360,978	Dec. 1903	1.50
U. S. Steel Corp., pf..	U. S	360,281.100	3,603,141	100	137,013,070	Aug. 1905	1 75
Va. Carolina Ch., cm.	U. S	38,000,000	279,844	100	3,678,829	June 1903	1.25
Va. Carolina Ch., pf..	U. S	20,000,000	180,000	100	9,660,869	Oct. 1905	2.00
Westmoreland Coal..	Pa	3,000,000	60,000	50	8,580,000	Oct. 1905	2.50

Canada, Mexico, Central and South America.

Name of Company and Location.		Author-ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Amistad y Conc'rdia.	Mex	$480,000	9,600	50	$258,064	Jan. 1905	$1.71
Butters' Salvador, g..	Salv	7 0,000	150,000	5	600,000	Apr. 1905	.25
Cariboo McKin'y, g..	B. C.	1,250,000	1,250,000	1	546,837	Feb. 1904	.04
Carmen, g. s.....	Mex	27,500	1,100	25	117,437	Jan. 1905	2.37
Copiapo, c.....	Chile	1,125,000	112,500	10	3,000,900	Oct. 1904	1.20½
Crow's Nest Pass	B. C.	3,500,000	121,486	25	968,947	Apr. 1904	2.50
Dominion Coal, com.	N. S.	15,000,000	150,000	100	1,050,000	Dec. 1903	1.75
Dominion Coal, pf....	N. S.	3,000,000	30,000	100	3,330,000	Jan. 1905	4.00
Dos Estrellas g. s....	Mex	150,000	3,000	50	1,020,5 5	July 1905	13.65
El Oro, g. s.....	Mex	5,750,000	1,080,000	5	2,708,800	July 1904	.15
Esperanza, s. g.....	Mex	2,275,000	455,000	5	1,486,349	May 1905	.12
Granby Con.....	B. C.	13,363,030	1,336,303	10	133,630	Dec. 1903	.10
Greene Con., copper..	Mex	8,640,000	864,000	10	3,057,600	Aug. 1905	.40
Greene Con., gold....	Mex	5,000,000	500,000	10	300,000	July 1905	.20
Guggenheim Expl....	Mex	17,000,000	105,000	100	1,837,500	July 1905	1.75
LeRoi No. 2, g.....	B. C.	3,000,000	120,000	25	403,200	Jan. 1905	2.48
N. Y. & Hond. Ros....	C. A.	1,500,000	150,000	10	2,040,000	Aug. 1905	.10
North Star.....	B. C.	1,500,000	1,300,000	1	351,000	Dec. 1904	1.00
N. S. St. & Coal, com.	N. S.	5,000,000	50,000	100	788,600	Nov. 1904	2.00
N. S. St. & Coal, pf....	N S.	2,000,000	10,300	100	309,000	Apr. 1905	2.00
Penoles.....	Mex	.....	3,399,800	...	59,375	July 1905	23 75
Providence, g. s.....	B. C.	200,000	40,000	5	22,224	Oct. 1904	.10
Reco, g. s.l	B. C.	1,000,000	958,000	1	307,082	Apr. 1905	.02
Slocan Star.....	B. C.	500,000	500,000	1	575,000	D c. 1904	.05
St. John del Rey, g...	Brazil	3,000,000	546,265	5	14,228,101	Dec. 1904	.12
St. Eugene Con.....	B. C.	3,500,000	3,202,000	1	338,080	Mar. 1905	.02
Tilt Cove, c.....	N. F.	1,000,000	89,000	2	21,360	Jan. 1905	.24
Tyee, c	B. C.	940 000	180,000	5	136,800	Dec. 1904	.48

NOTE.—These dividends are published gratuitously. Readers are invited to send any additions or corrections which they think necessary to complete our list.